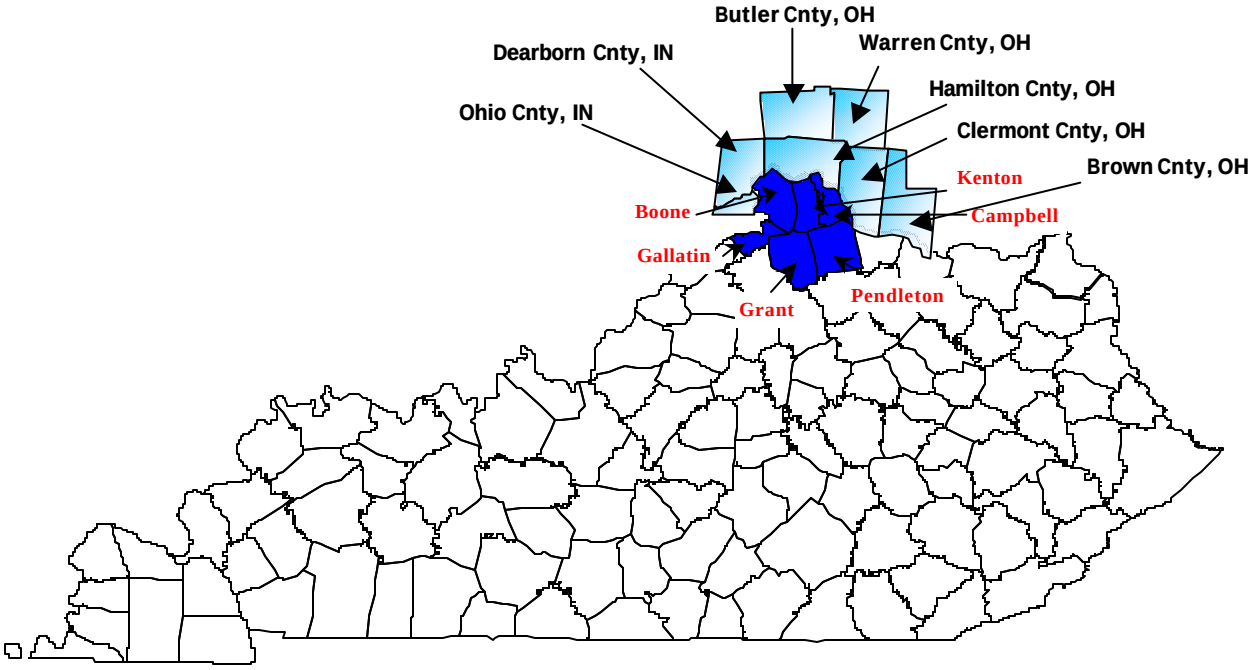
# Kentucky Portion of the Cincinnati-Hamilton, OH-KY-IN MSA




The Cincinnati-Hamilton Metropolitan Statistical Area (MSA) was listed in 2001 as being the 24th largest MSA within the United States. This MSA encompasses three states and thirteen counties. It includes Dearborn and Ohio Counties in Indiana, Butler, Brown, Clermont, Hamilton, and Warren Counties in Ohio, and Boone, Campbell, Gallatin, Grant, Kenton, and Pendleton Counties in Kentucky.

This is the northern most geographic region of Kentucky and the apex of an industrial triangle anchored by Louisville on the southwest and Lexington on the southeast. Within the triangle is more than a third of the state's population and nearly one-half of its manufacturing jobs. The interstate highway system places these three metropolitan areas within less than two hours driving from each other.

# BOONE COUNTY, KENTUCKY

Boone County is part of the Cincinnati-Hamilton, OH-KY-IN Metropolitan Statistical Area (MSA) and is located to the west of Kenton County, Kentucky, to the north of Grant County, Kentucky, to the northeast of Gallatin County, Kentucky, and to the southwest of Cincinnati, Ohio.

## Geography/Topography

Boone County has a land area of 246 square miles and is located on the banks of the Ohio River in the tri-state area of Kentucky, Ohio and Indiana. The Cincinnati/Northern Kentucky International Airport, located in Boone County, provides commercial and airline service.

## Meteorological Information

Due to the close proximity of Cincinnati, Ohio, meteorological data from Cincinnati was used for this Kentucky area. Wind speed/wind direction information shows that the majority of the time for the period 1988–1992, the wind in the Boone County area came from the southwest and typically from 7-10 knots. (See figure 1-A) The mean high temperature for July for the area from 1961 through 1990 was 86?F, the mean low was 66?F. The mean precipitation for the same period was 3.8 inches.

## Planning

The authority for air quality planning in the Boone County area resides with the Kentucky Environmental and Public Protection Cabinet. Transportation planning for Boone County is performed by the Ohio, Kentucky, Indiana Regional Council of Governments (OKI).

## Air Monitoring

For the 2001 – 2003 monitoring period, there were no $PM_{2.5}$ monitors located in Boone County. However, the Kenton County monitor to the east for 2001 – 2003 shows an average annual design value of 14.9 micrograms per cubic meter, which achieves the $PM_{2.5}$ annual National Ambient Air Quality Standard (NAAQS - 15 micrograms per cubic meter) and is classified as a county in attainment. In addition for the 2001 – 2003 monitoring period, the $PM_{2.5}$ monitor in Campbell County, shows an average annual design value of 13.9 micrograms per cubic meter, which is also in attainment of the annual standard. However, because the Ohio monitors in Hamilton and Butler Counties across the Ohio River show exceedances of the annual $PM_{2.5}$ standard, information for Boone County is being presented in this document. The monitoring information for 2003 is complete for the Kentucky counties. However, the 2003 monitoring data reported for the Ohio counties is the latest available and is not complete through December 2003. (See table 1-A)

## Population

Based on projections to 2002 from the 2000 census data, there are 93,290 persons living in Boone County. (See table 1-C) That represents approximately 379 persons per square mile. The population of Boone County is approximately 25% rural with the remaining 75% living in incorporated areas. The largest cities in Boone County are Florence and Burlington.

Boone County's population from 1990 through 2000 increased by approximately 49.3% (57,589 to 85,991). The population is further expected to increase by an additional 46.6% between 2000 and 2010. (See table 1-B)

For the entire Cincinnati-Hamilton, OH-KY-IN MSA, Boone County represents approximately 4.6% of the total population in the MSA and 24.5% of the Kentucky portion of the MSA. (See table 1-C)

## Air Emissions

The emissions presented in this document are from the U.S. EPA's 1999 National Emission Inventory (NEI). In addition, the $PM_{2.5}$ emissions provided in this document are for primary $PM_{2.5}$ from the 1999 NEI. Primary $PM_{2.5}$ is directly emitted from a stack or an open source and includes filterable and condensible particles.

## Point Sources

Point source VOC emissions from Boone County were estimated at 877 tons per year in 1999, which represents approximately 49% of the total 1,752 tpy of overall VOC point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Point source $NO_x$ emissions from Boone County were estimated at 10,248 tons per year in 1999, which represents approximately 84% of the total 12,289 tpy of the $NO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

Point source $SO_x$ emissions from Boone County were estimated at 18,147 tons per year in 1999, which represents approximately 98% of the total 18,635 tpy overall $SO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

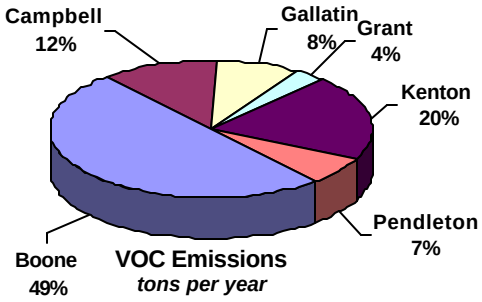
Point source $NH_3$ emissions from Boone County were estimated at 17 tons per year in 1999, which represents 68% of the total 25 tpy overall $NH_3$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1F)

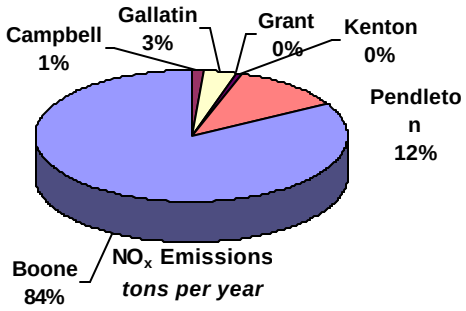
Point source $PM_{2.5}$ emissions from Boone County were estimated at 196 tons per year in 1999, which represents approximately 39% of the total 510 tpy overall

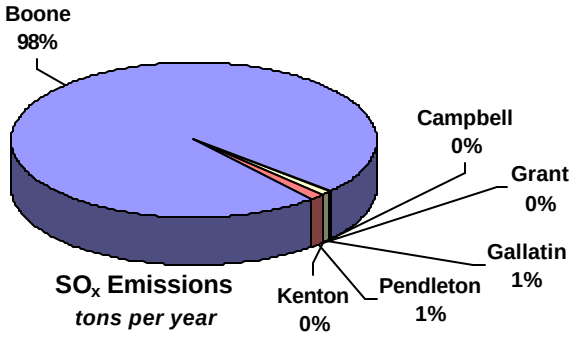
$PM_{2.5}$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

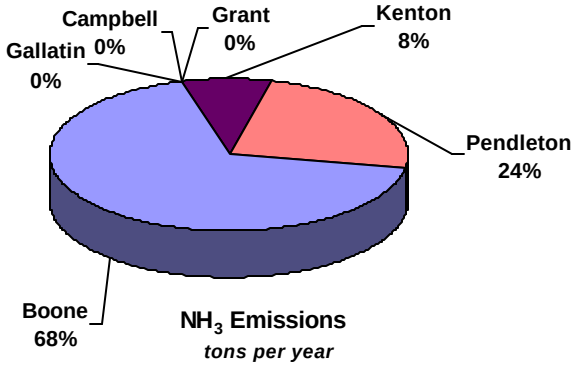
A comparison across the entire Ohio, Kentucky, Indiana MSA was performed using the federal 1999 National Emission Inventory data. Tables 1-D through 1-G and Figures 1-E through 1-K provide a comparison of Boone County's emissions to the entire region.

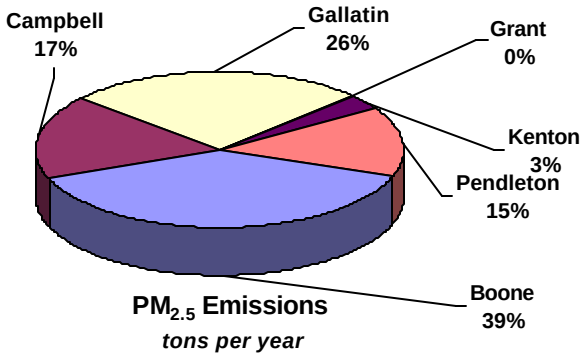
## 1999 NEI Cincinnati-Hamilton, OH-KY-IN
## Northern Kentucky
## Point Source Emissions
### (tons per year)



Point sources located within Boone County are subject to PSD requirements, CTG RACT requirements, Maximum Achievable Control Technology (MACT) requirements for sources of Hazardous Air Pollutants, and New Source Performance Standards (NSPS). Any controls imposed as a result of previous nonattainment designations are required to remain in Boone County.

**Onroad Mobile**

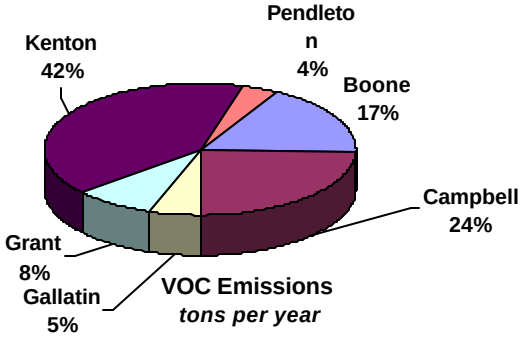
Onroad mobile source VOC emissions from Boone County were estimated at 1,478 tons per year in 1999, which represents approximately 17% of the total 8,505 tpy of overall VOC onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Onroad mobile source $NO_x$ emissions from Boone County were estimated at 2,868 tons per year in 1999, which represents approximately 20% of the total 14,441 tons per year of overall $NO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

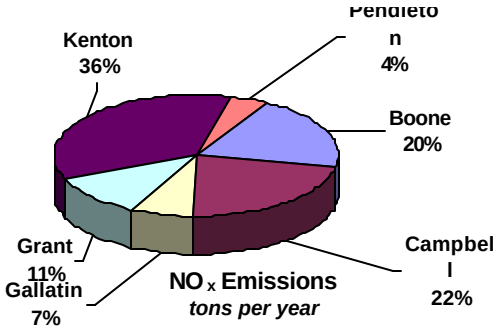
Onroad mobile source $SO_x$ emissions from Boone County were estimated at 105 tons per year in 1999, which represents approximately 19% of the total 546 tpy of overall $SO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

Onroad mobile source $NH_3$ emissions from Boone County were estimated at 84 tons per year in 1999, which represents approximately 18% of the total 457 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

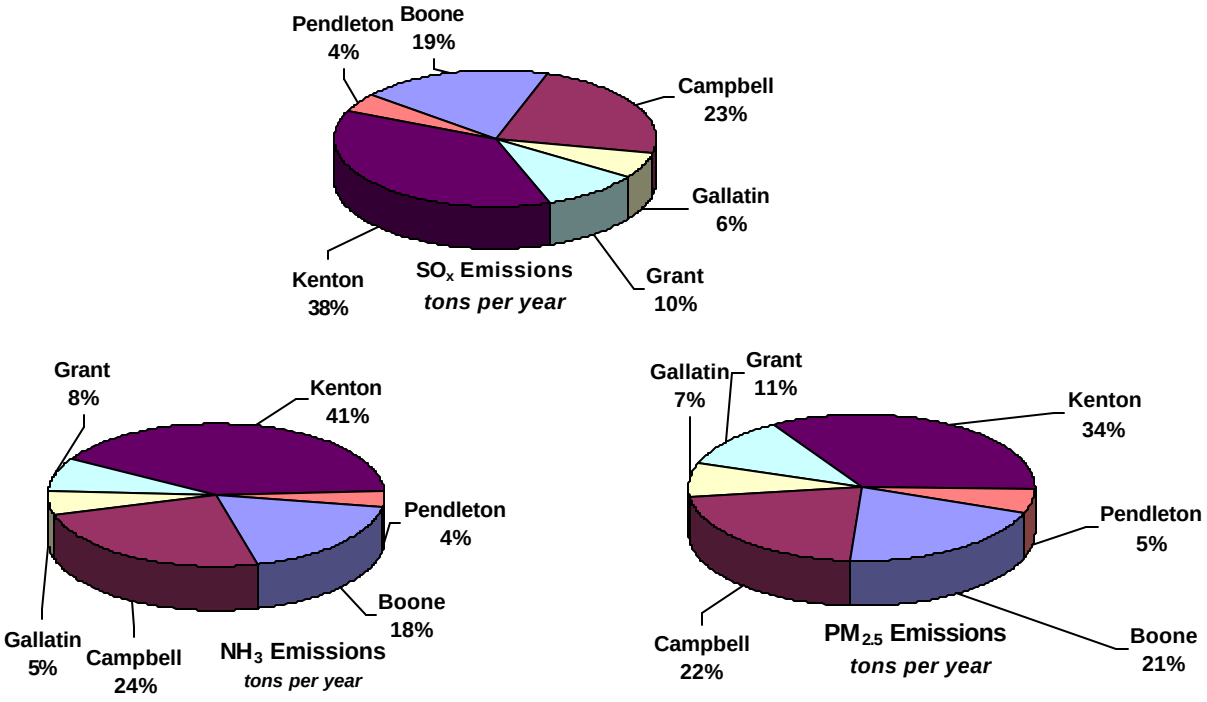
Onroad mobile source $PM_{2.5}$ emissions from Boone County were estimated at 64 tons per year in 1999, which represents approximately 21% of the total 311 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

**1999 NEI Northern Kentucky**
**Onroad Mobile Source Emissions**
**(*tons per year*)**



# 1999 NEI Northern Kentucky
# Onroad Mobile Source Emissions
**(*continued*)**




Based on information obtained from the Kentucky Transportation Cabinet, commuting traffic from other counties into Boone County is 63.1% and classified as significant, and the commuting traffic from Boone County into other counties is high at 47%.

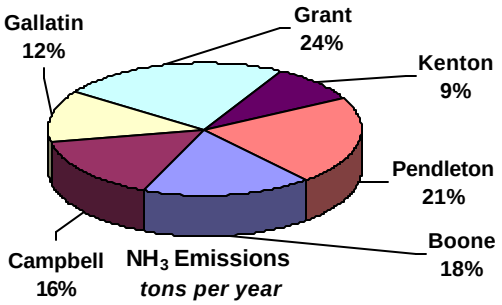
| Commuting Classifications | |
|---|---|
| Not Significant | 0-10% |
| Minimal | 11-30% |
| High | 31-50% |
| Significant | 51% or more |

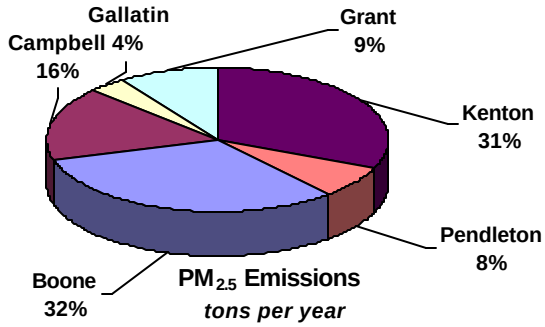
## Area Sources

Area source $NH_3$ emissions from Boone County were estimated at 388 tons per year in 1999, which represents approximately 18% of the total 2,204 tpy of overall $NH_3$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

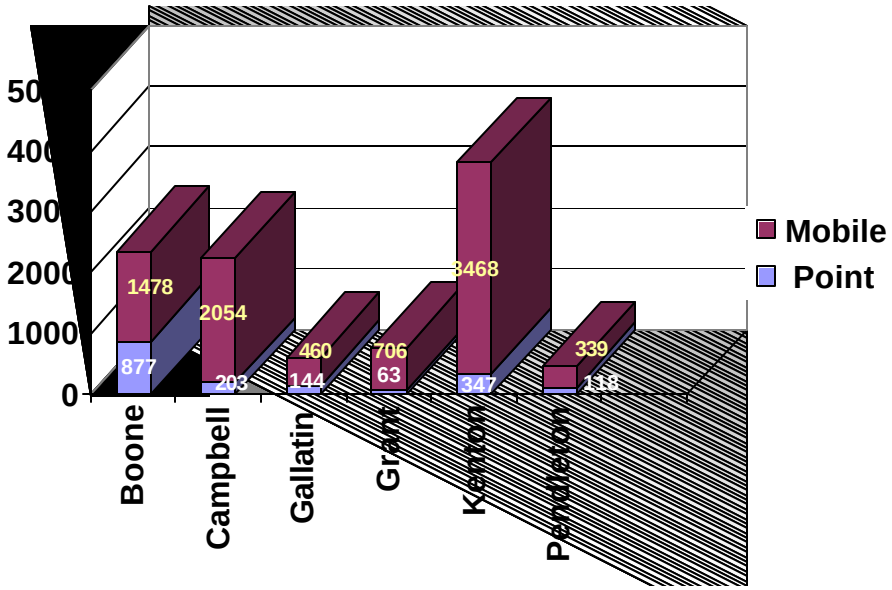
Area source $PM_{2.5}$ emissions from Boone County were estimated at 1,542 tons per year in 1999, which represents approximately 32% of the total 4,873 tpy of overall $PM_{2.5}$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

## 1999 NEI Northern Kentucky Area Source Emissions
**(tons per year)**

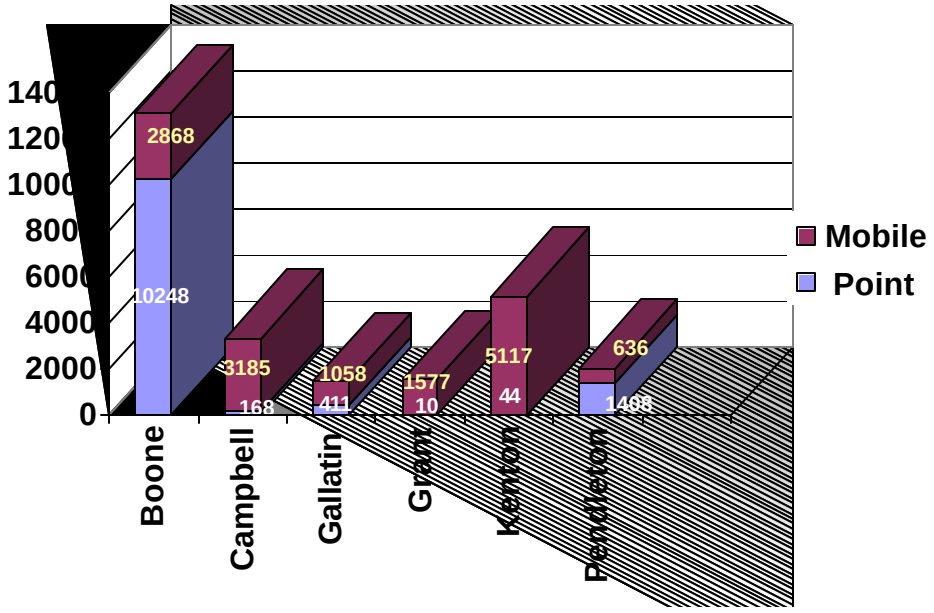


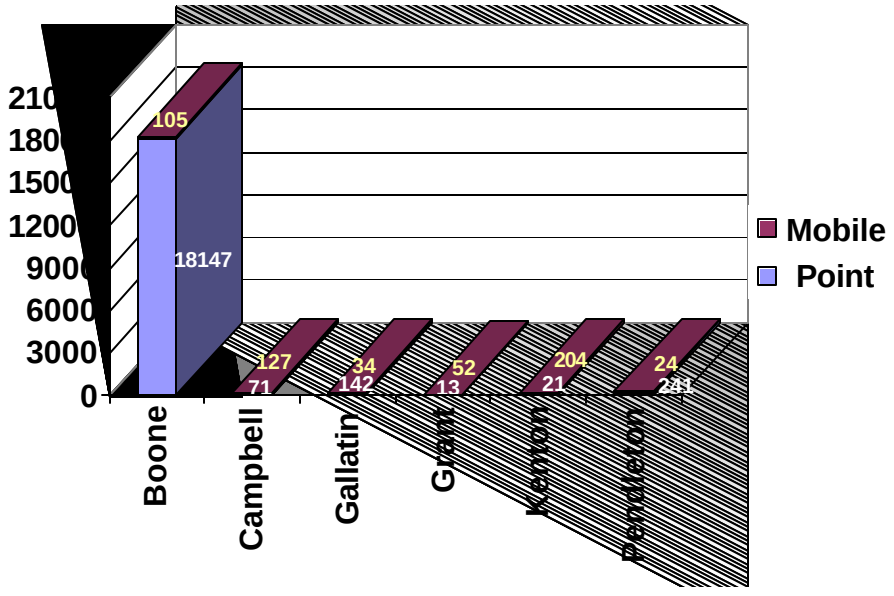

## 1999 NEI VOC Contribution
**(tons per year)**



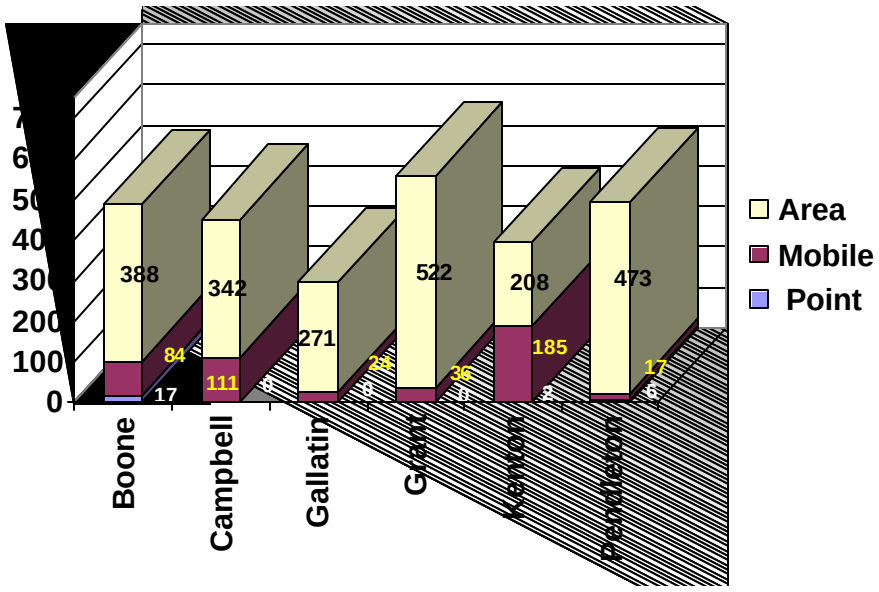
## 1999 NEI $NO_x$ Contribution
(tons per year)



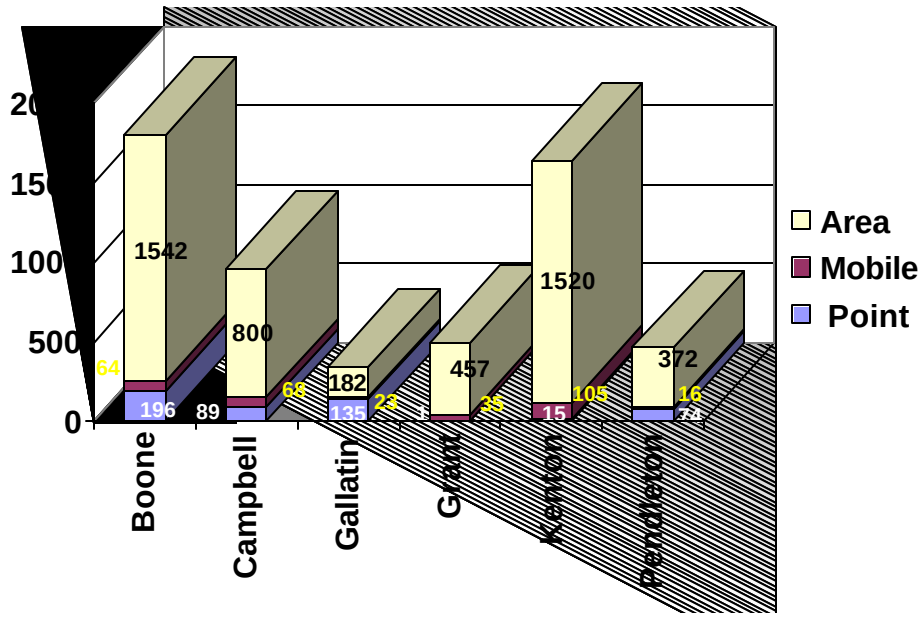

## 1999 NEI $SO_x$ Contribution
(tons per year)



## 1999 NEI $NH_3$ Contribution
(tons per year)




## 1999 NEI $PM_{2.5}$ Contribution
(tons per year)



## Conclusion and Recommendation

For the 2001 – 2003 monitoring period, there were no $PM_{2.5}$ monitors located in Boone County. However, for the 2001 – 2003 monitoring period, the Kenton County $PM_{2.5}$ monitor directly to the east shows an average annual design value of 14.9 micrograms per cubic meter, which achieves the National Ambient Air Quality Standard (NAAQS) and is classified as a county in attainment. As well, for the 2001 – 2003 monitoring period, the Campbell County $PM_{2.5}$ monitor further to the east shows an average annual design value of 13.9 micrograms per cubic meter, which is also in attainment of the standard.

Additionally, the emissions from Boone do not significantly contribute to the $PM_{2.5}$ violations in the MSA. While Boone County is a large contributor of both NOx and VOC within the Kentucky portion of the MSA, combined with the remainder of the MSA, it contributes only 5% of total VOC emissions, 7% of the total $NO_x$ emissions, 7% of the total $SO_x$ emissions, 5% of the total $NH_3$ emissions and 6% of the total $PM_{2.5}$ emissions (See Tables 1-D through 1-G). Additionally substantial $NO_x$ reductions have occurred during the last year from East Bend Power Plant which would further lower the contribution of NOx emissions from Boone County.

Therefore, based on the monitoring and emission data, Boone County is providing a negligible contribution to PM2.5 levels in the area and should be designated attainment for the $PM_{2.5}$ standard.

# CAMPBELL COUNTY, KENTUCKY

Campbell County is part of the Cincinnati-Hamilton, OH-KY-IN Metropolitan Statistical Area (MSA) and is located to the east of Kenton County, Kentucky, to the north of Pendleton County, Kentucky, and to the southeast of Cincinnati, Ohio.

## Geography/Topography

Campbell County has a land area of 151 square miles and is located on the banks of the Ohio River in the tri-state area of Kentucky, Ohio and Indiana. The I-275 belt line surrounds the Cincinnati-Northern Kentucky Area, traversing, Boone, Kenton, and Campbell Counties. Interstate 471 extends from I-275 in Campbell county north across the Ohio River to I-71.

## Meteorological Information

Due to the close proximity of Cincinnati, Ohio, meteorological data from Cincinnati was used for this Kentucky area. Wind speed/wind direction information shows that the majority of the time for the period 1988–1992, the wind in the Campbell County area came from the southwest and typically from 7-10 knots. (See figure 1-A) The mean high temperature for July for the area from 1961 through 1990 was 86?F, the mean low was 66?F. The mean precipitation for the same period was 3.8 inches.

## Planning

The authority for air quality planning in the Campbell County area resides with the Kentucky Environmental and Public Protection Cabinet. Transportation planning for Campbell County is performed by the Ohio, Kentucky, Indiana Regional Council of Governments (OKI).

## Air Monitoring

For the 2001 – 2003 monitoring period, the $PM_{2.5}$ monitor in Campbell County shows an average annual design value of 13.9 micrograms per cubic meter, which achieves the standard and is classified as a county in attainment of the $PM_{2.5}$ annual National Ambient Air Quality Standards (NAAQS - 15 micrograms per cubic meter). The Kenton County monitor to the west shows an average annual design value of 14.9 micrograms per cubic meter, which also achieves the standard and is classified as a county in attainment. However, because the Ohio monitors in Hamilton and Butler Counties across the Ohio River show exceedances of the annual $PM_{2.5}$ standard, information for Campbell County is being presented in this document. The monitoring information for 2003 is complete for the Kentucky counties. However, the 2003 monitoring data reported for the Ohio counties is the latest available and may not be complete through December 2003. (See table 1-A)

## Population

Based on projections to 2002 from the 2000 census data, there are 88,604 persons living in Campbell County. (See table 1-C) That represents approximately 587 persons per square mile. The population of Campbell County is approximately 15.7% rural with the remaining 84.3% living in incorporated areas. The largest cities in Campbell County are Newport and Ft. Thomas.

Campbell County's population from 1990 through 2000 increased by approximately 5.7% (83,866 to 88,616). The population is further expected to increase by an additional 4.3% between 2000 and 2010. (See table 1-B)

For the entire Cincinnati-Hamilton, OH-KY-IN MSA, Campbell County represents approximately 4.4% of the total population in the MSA and 23.2% of the Kentucky portion of the MSA. (See table 1-C)

## Air Emissions

The emissions presented in this document are from the U.S. EPA's 1999 National Emission Inventory (NEI). In addition, the $PM_{2.5}$ emissions provided in this document are for primary $PM_{2.5}$ from the 1999 NEI. Primary $PM_{2.5}$ is directly emitted from a stack or an open source and includes filterable and condensible particles.

## Point Sources

Point source VOC emissions from Campbell County were estimated at 203 tons per year (tpy) in 1999, which represents approximately 12% of the total 1752 tpy of overall VOC point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Point source $NO_x$ emissions from Campbell County were estimated at 168 tons per year (tpy) in 1999, which represents approximately 1% of the total 12,289 tpy of overall $NO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

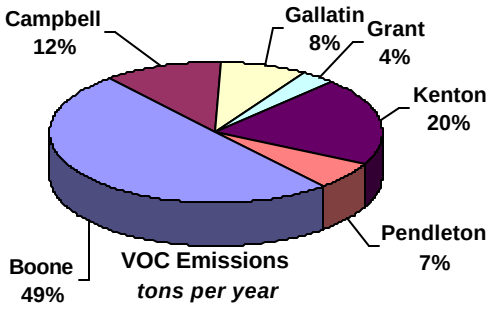
Point source $SO_x$ emissions from Campbell County were estimated at 71 tons per year in 1999, which approximately 1% of the total 18,635 tpy overall $SO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

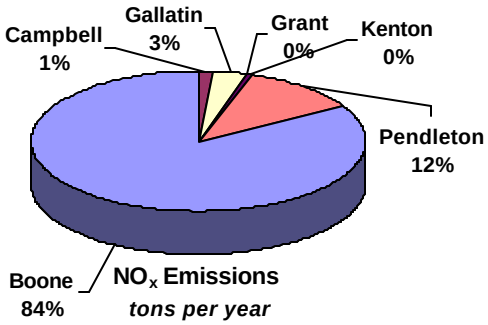
Point source $NH_3$ emissions from Campbell County were estimated at 0 tons per year in 1999. (See table 1-F)

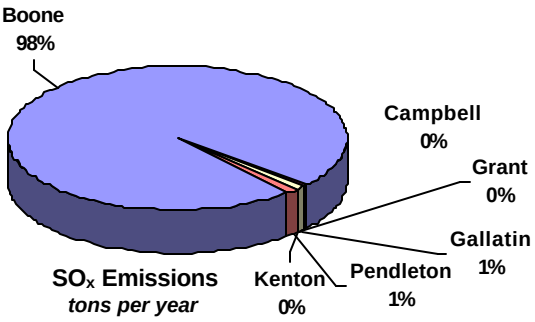
Point source $PM_{2.5}$ emissions from Campbell County were estimated at 89 tons per year in 1999, which represents approximately 17% of the total 510 tpy overall $PM_{2.5}$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

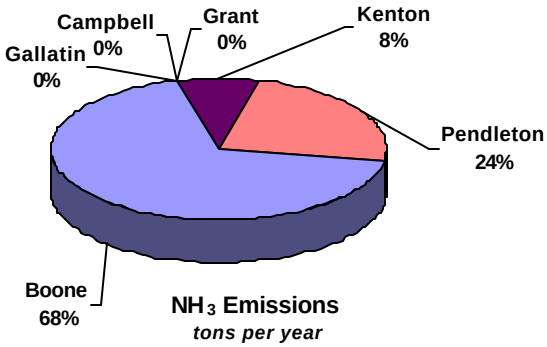
Point sources located within Campbell County are subject to PSD requirements, CTG RACT requirements, Maximum Achievable Control Technology (MACT) requirements for sources of Hazardous Air Pollutants, and New Source Performance Standards (NSPS). Any controls imposed as a result of previous nonattainment designations are required to remain in Campbell County.

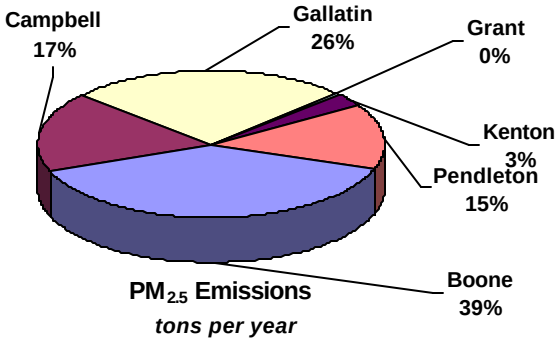
## 1999 NEI Cincinnati-Hamilton, OH-KY-IN
## Point Source Emissions
### (tons per year)



**Onroad Mobile**

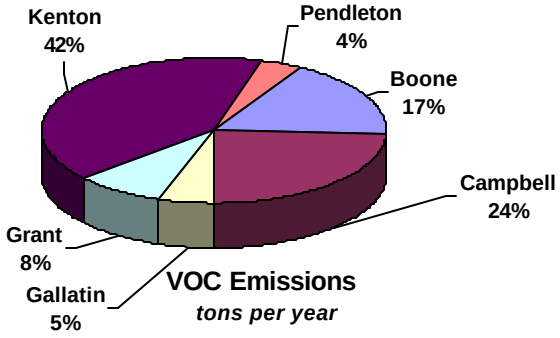
Onroad mobile source VOC emissions from Campbell County were estimated at 2,054 tons per year in 1999, which represents approximately 24% of the total 8,505 tpy of overall VOC onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Onroad mobile source $NO_x$ emissions from Campbell County were estimated at 3185 tons per year in 1999, which represents approximately 22% of the total 14,441 tons per year of overall $NO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

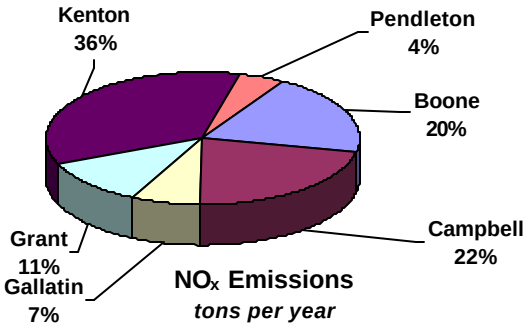
Onroad mobile source $SO_x$ emissions from Campbell County were estimated at 127 tons per year in 1999, which represents approximately 23% of the total 546 tpy of overall $SO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

Onroad mobile source $NH_3$ emissions from Campbell County were estimated at 111 tons per year in 1999, which represents approximately 24% of the total 457 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

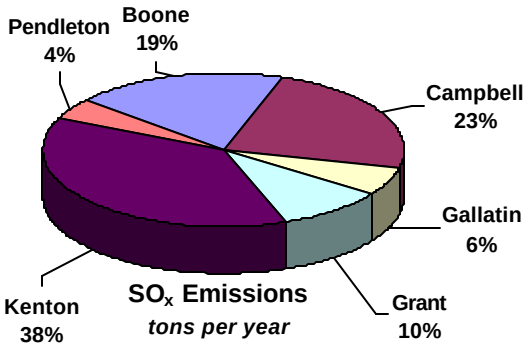
Onroad mobile source $PM_{2.5}$ emissions from Campbell County were estimated at 68 tons per year (tpy) in 1999, which represents approximately 22% of the total 311 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

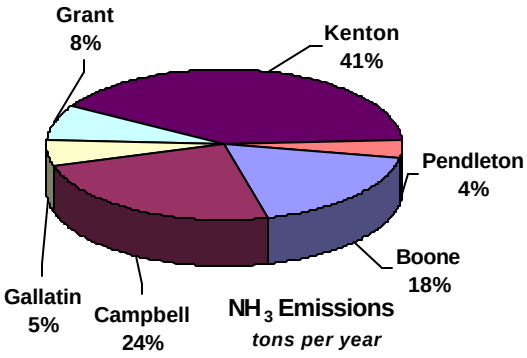
**1999 Northern Kentucky**
**Onroad Mobile Source Emissions**
**(tons per year)**

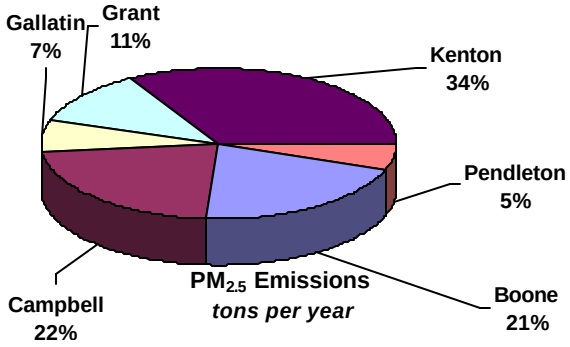


## 1999 Northern Kentucky
## Onroad Mobile Source Emissions
## *(continued)*




Based on information obtained from the Kentucky Transportation Cabinet, commuting traffic from other counties into Campbell County is 42.5% and classified as high, and the commuting traffic from Campbell County into other counties is significant at 63.9%.

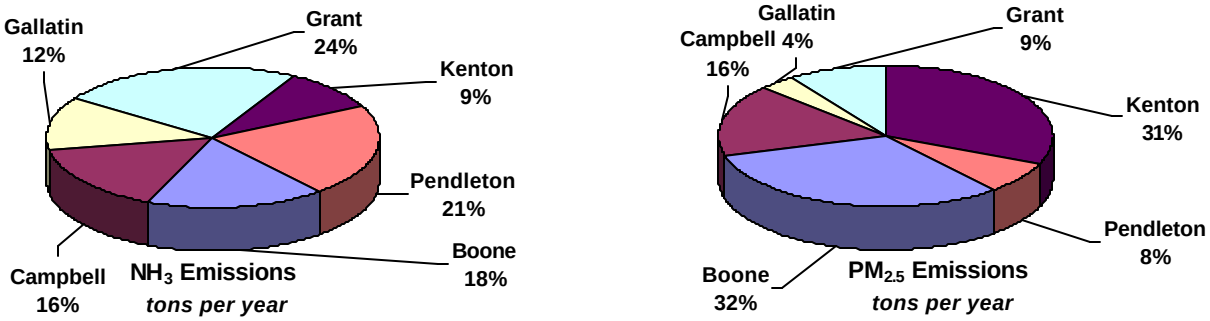
| Commuting Classifications | |
|---|---|
| Not Significant | 0-10% |
| Minimal | 11-30% |
| High | 31-50% |
| Significant | 51% or more |

### Area Sources

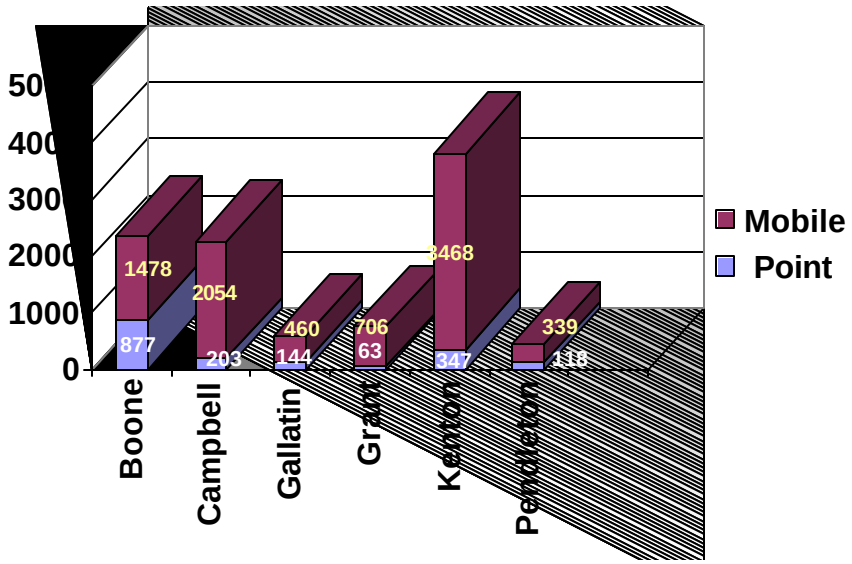
Area source $NH_3$ emissions from Campbell County were estimated at 342 tons per year in 1999, which represents approximately 16% of the total 2,204 tpy of overall $NH_3$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

Area source $PM_{2.5}$ emissions from Campbell County were estimated at 800 tons per year in 1999, which represents approximately 16% of the total 4,873 tpy of overall $PM_{2.5}$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

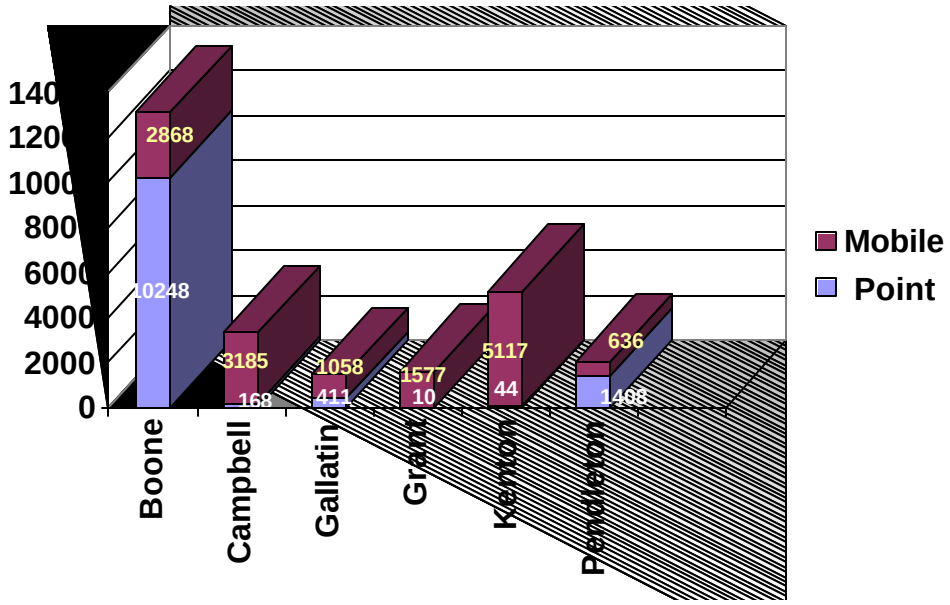
**1999 NEI Northern Kentucky Area Source Emissions**
**(*tons per year*)**



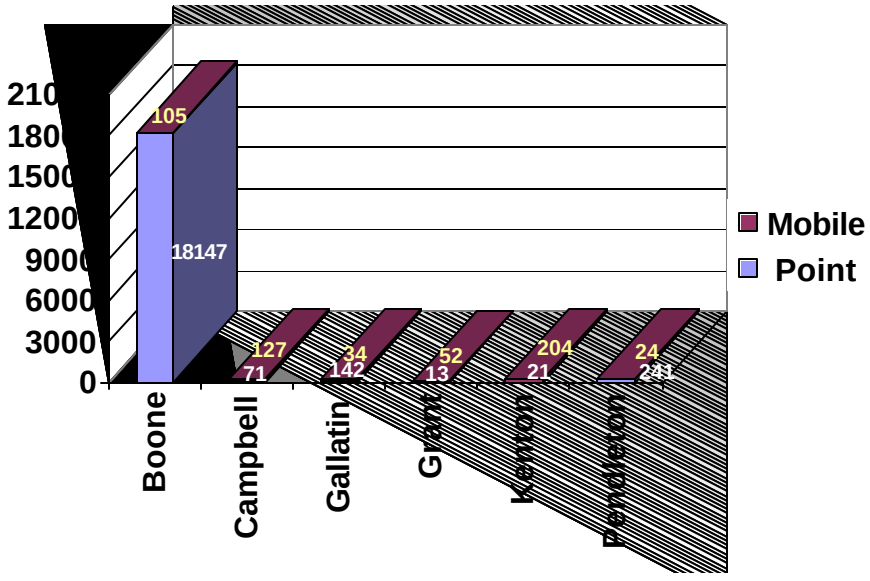

**1999 NEI VOC Contribution**
**(tons per year)**



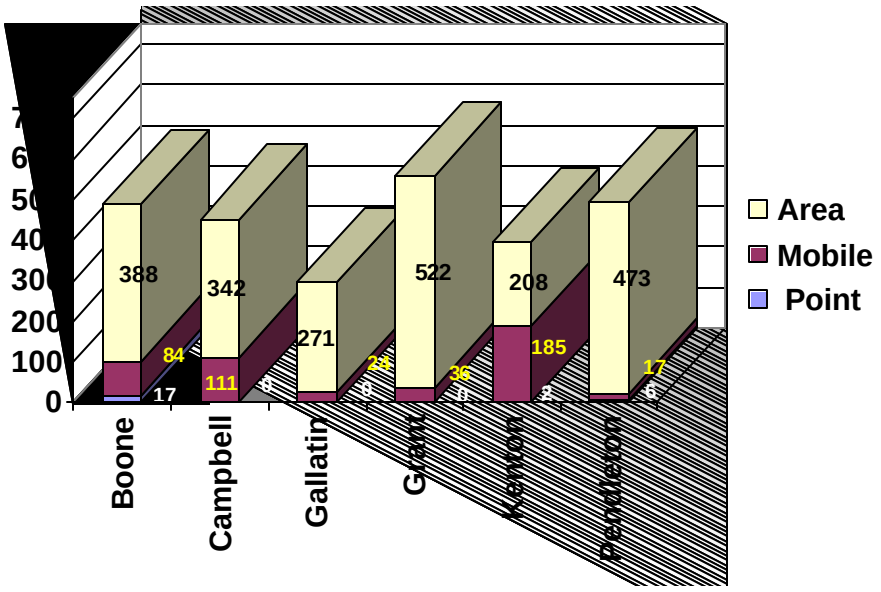
## 1999 NEI $NO_x$ Contribution
(tons per year)



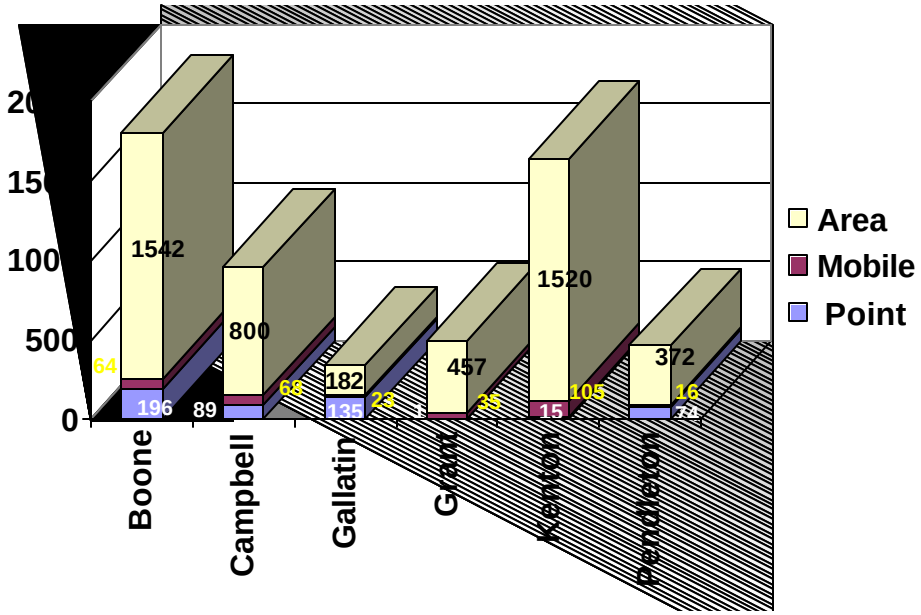

## 1999 NEI $SO_x$ Contribution
(tons per year)



## 1999 NEI $NH_3$ Contribution
(tons per year)




## 1999 NEI $PM_{2.5}$ Contribution
(tons per year)



## Conclusion and Recommendation

For the 2001 – 2003 monitoring period, the Campbell County $PM_{2.5}$ monitor shows an average annual design value of 13.9 micrograms per cubic meter, which achieves the National Ambient Air Quality Standard (NAAQS) and should be classified as a county in attainment. As well, for the 2001 – 2003 monitoring period, the Kenton County $PM_{2.5}$ monitor directly to the west shows an average annual design value of 14.9 micrograms per cubic meter, which is also in attainment of the standard.

Additionally, the emissions from Campbell County compared to the remainder of the MSA are negligible and do not significantly contribute to the $PM_{2.5}$ violations in the MSA. Campbell County contributes approximately 5% of the total VOC emissions, 2% of the total $NO_x$ emissions, less than 1% of the total $SO_x$ emissions, 5% of the total $NH_3$ emissions and 3% of the total $PM_{2.5}$ emissions in the MSA.

Therefore, based on the monitoring and emissions, data Campbell County should be designated attainment for the $PM_{2.5}$ standard.

# KENTON COUNTY, KENTUCKY

Kenton County is part of the Cincinnati-Hamilton, OH-KY-IN Metropolitan Statistical Area (MSA) and is located to the west of Campbell County, Kentucky, to the east of Boone County, Kentucky, and to the south of Cincinnati, Ohio.

## Geography/Topography

Kenton County has a land area of 162 square miles and is located on the banks of the Ohio River in the tri-state area of Kentucky, Ohio and Indiana.

## Meteorological Information

Due to the close proximity of Cincinnati, Ohio, meteorological data from Cincinnati was used for this Kentucky area. Wind speed/wind direction information shows that the majority of the time for the period 1988–1992, the wind in the Kenton County area came from the southwest and typically from 7-10 knots. (See figure 1-A) The mean high temperature for July for the area from 1961 through 1990 was 86?F, the mean low was 66?F. The mean precipitation for the same period was 3.8 inches.

## Planning

The authority for air quality planning in the Kenton County area resides with the Kentucky Environmental and Public Protection Cabinet. Transportation planning for Kenton County is performed by the Ohio, Kentucky, Indiana Regional Council of Governments (OKI).

## Air Monitoring

For the 2001 – 2003 monitoring period, the $PM_{2.5}$ monitor in Kenton County shows an annual average design value of 14.9 micrograms per cubic meter, which achieves the $PM_{2.5}$ annual National Ambient Air Quality Standard (NAAQS - 15 micrograms per cubic meter) and is classified as a county in attainment. In addition, the Campbell County monitor shows an average annual design value of 13.9 micrograms per cubic meter, which also achieves the standard and is classified as a county in attainment of the annual standard. However, because the Ohio monitors in Hamilton and Butler Counties across the Ohio River show exceedances of the annual $PM_{2.5}$ standard, information for Kenton County is being presented in this document. The monitoring information for 2003 is complete for the Kentucky counties. However, the 2003 monitoring data reported for the Ohio counties is the latest available and may not be complete through December 2003.

## Population

Based on projections to 2002 from the 2000 census data, there are 152,164 persons living in Kenton County. (See table 1-C) That represents approximately 939 persons per square mile. The population of Kenton County is approximately 7% rural with the remaining 93% living in incorporated areas. The largest cities in Kenton County are Covington and Erlanger.

Kenton County's population from 1990 through 2000 increased by approximately 6.6% (142,031 to 151,464). The population is further expected to increase by an additional 5.5% between 2000 and 2010. (See table 1-B)

For the entire Cincinnati-Hamilton MSA, Kenton County represents approximately 7.5% of the total population in the MSA and 40% of the Kentucky portion of the MSA. (See table 1-C)

## Air Emissions

The emissions presented in this document are from the U.S. EPA's 1999 National Emission Inventory (NEI). In addition, the $PM_{2.5}$ emissions provided in this document are for primary $PM_{2.5}$ from the 1999 NEI. Primary $PM_{2.5}$ is directly emitted from a stack or an open source and includes filterable and condensible particles.

## Point Source

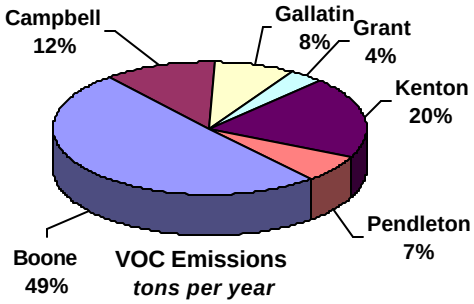
Point source VOC emissions from Kenton County were estimated at 347 tons per year in 1999, which represents approximately 20% of the total 1,752 tpy of overall VOC point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Point source $NO_x$ emissions from Kenton County were estimated at 44 tons per year in 1999, which is less than 1% of the total 12,289 tpy of the $NO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

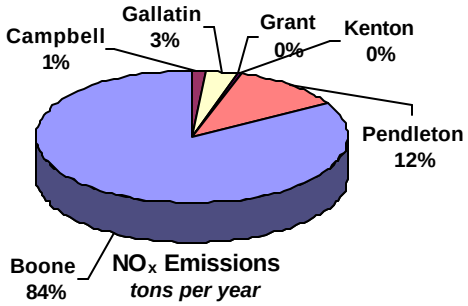
Point source $SO_x$ emissions from Kenton County were estimated at 21 tons per year in 1999, which represents approximately 0.5% of the total 18,635 tpy overall $SO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

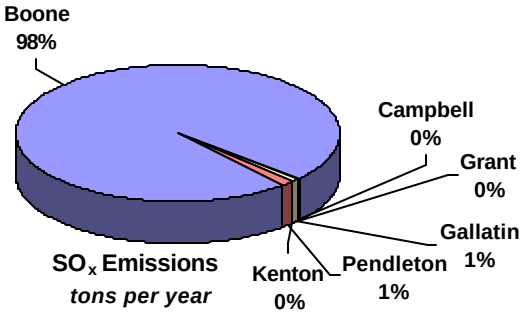
Point source $NH_3$ emissions from Kenton County were estimated at 2 tons per year in 1999, which represents 8% of the total 25 tpy overall $NH_3$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

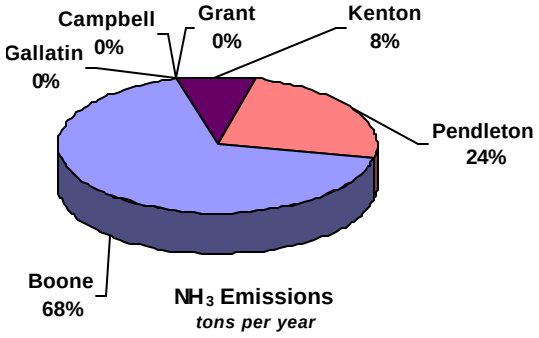
Point source $PM_{2.5}$ emissions from Kenton County were estimated at 15 tons per year in 1999, which represents approximately 3% of the total 510 tpy overall $PM_{2.5}$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

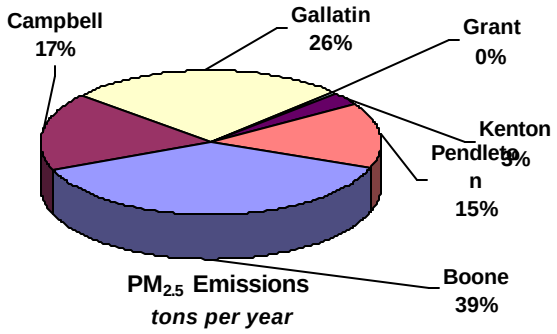
## 1999 NEI Northern Kentucky Point Source Emissions
**(*tons per year*)**



Point sources located within Kenton County are subject to PSD requirements, CTG RACT requirements, Maximum Achievable Control Technology (MACT) requirements for sources of Hazardous Air Pollutants, and New Source Performance Standards (NSPS). Any controls imposed as a result of previous nonattainment designations are required to remain in Kenton County.

**Onroad Mobile**

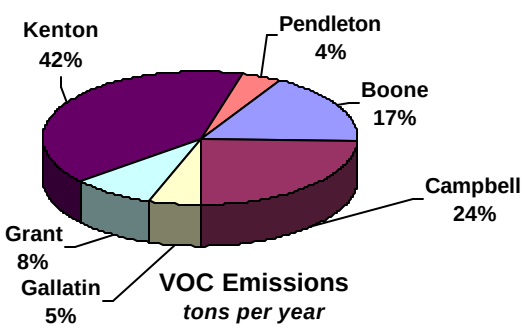
Onroad mobile source VOC emissions from Kenton County were estimated at 3,468 tons per year in 1999, which represents approximately 42% of the total 8,505 tpy of overall VOC onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Onroad mobile source $NO_x$ emissions from Kenton County were estimated at 5,117 tons per year in 1999, which represents approximately 36% of the total 14,441 tons per year of overall $NO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

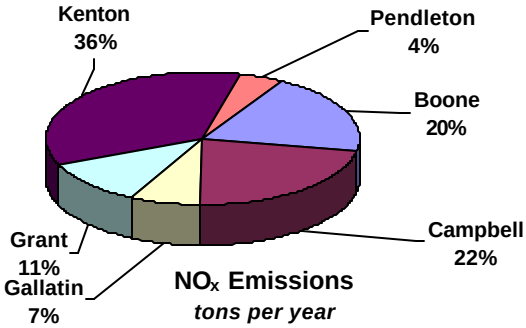
Onroad mobile source $SO_x$ emissions from Kenton County were estimated at 204 tons per year in 1999, which represents approximately 38% of the total 546 tpy of overall $SO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

Onroad mobile source $NH_3$ emissions from Kenton County were estimated at 185 tons per year in 1999, which represents approximately 41% of the total 457 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

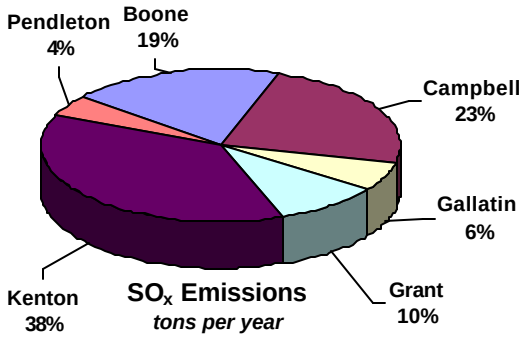
Onroad mobile source $PM_{2.5}$ emissions from Kenton County were estimated at 105 tons per year in 1999, which represents approximately 34% of the total 311 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

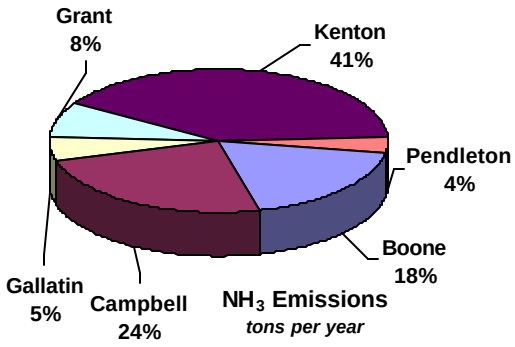
**1999 NEI Northern Kentucky**
**Onroad Mobile Source Emissions**
**(tons per year)**

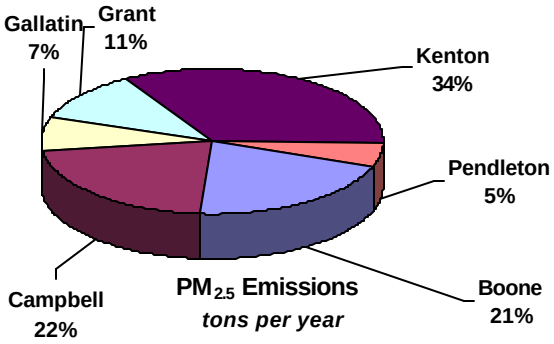


## 1999 NEI Northern Kentucky
## Onroad Mobile Source Emissions
## (*continued*)




Based on information obtained from the Kentucky Transportation Cabinet, commuting traffic from other counties into Kenton County is 48.5% and classified as high, and the commuting traffic from Kenton County into other counties is significant at 59.6%.

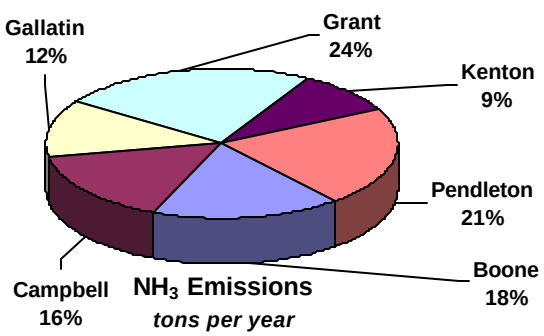
| Commuting Classifications | |
|---|---|
| Not Significant | 0-10% |
| Minimal | 11-30% |
| High | 31-50% |
| Significant | 51% or more |

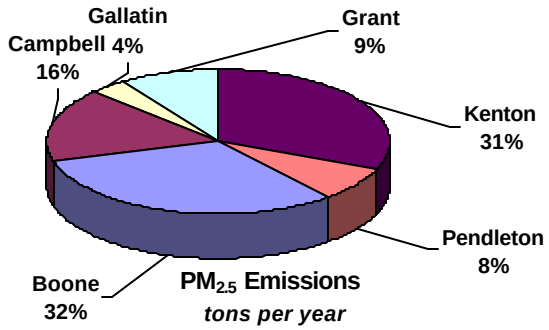
### Area Sources

Area source $NH_3$ emissions from Kenton County were estimated at 208 tons per year in 1999, which represents approximately 9% of the total 2,204 tpy of overall $NH_3$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

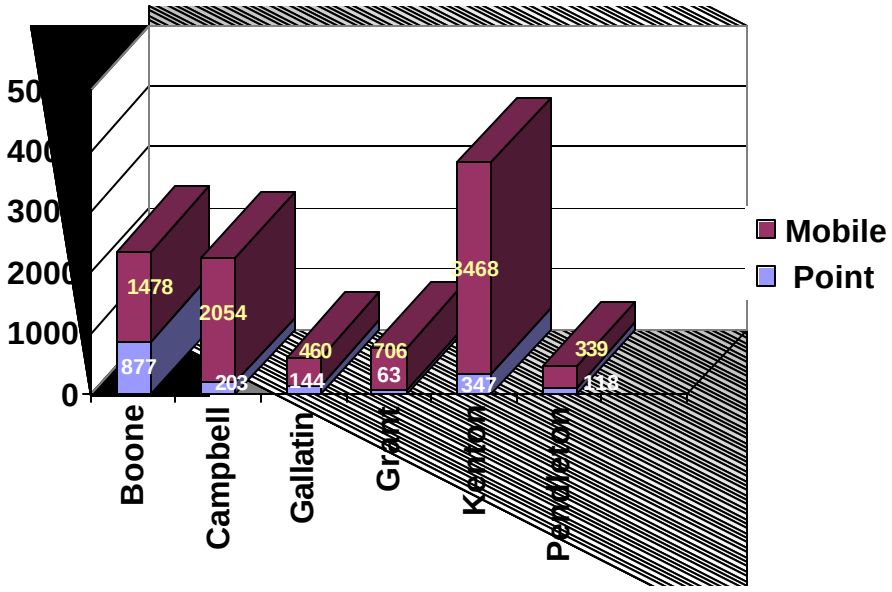
Area source $PM_{2.5}$ emissions from Kenton County were estimated at 1,520 tons per year in 1999, which represents approximately 31% of the total 4,873 tpy of overall $PM_{2.5}$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

**1999 NEI Cincinnati-Hamilton MSA**
**Area Source Emissions**
**(tons per year)**

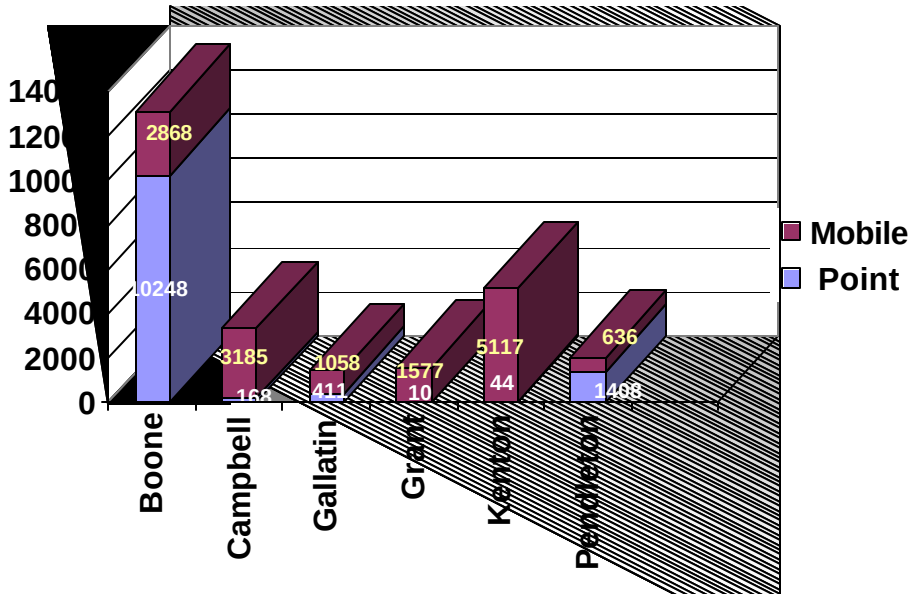


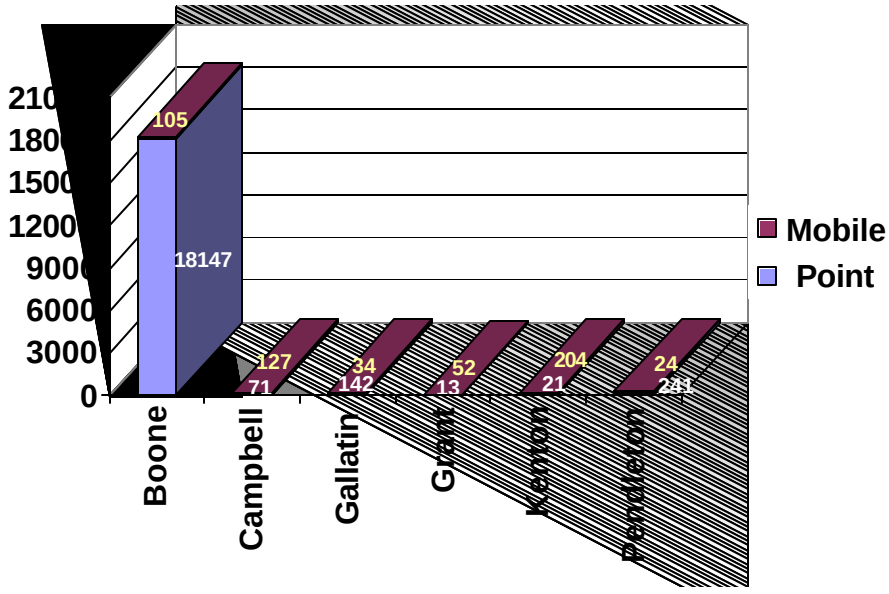

**1999 NEI VOC**
**Contribution**
**(tons per year)**



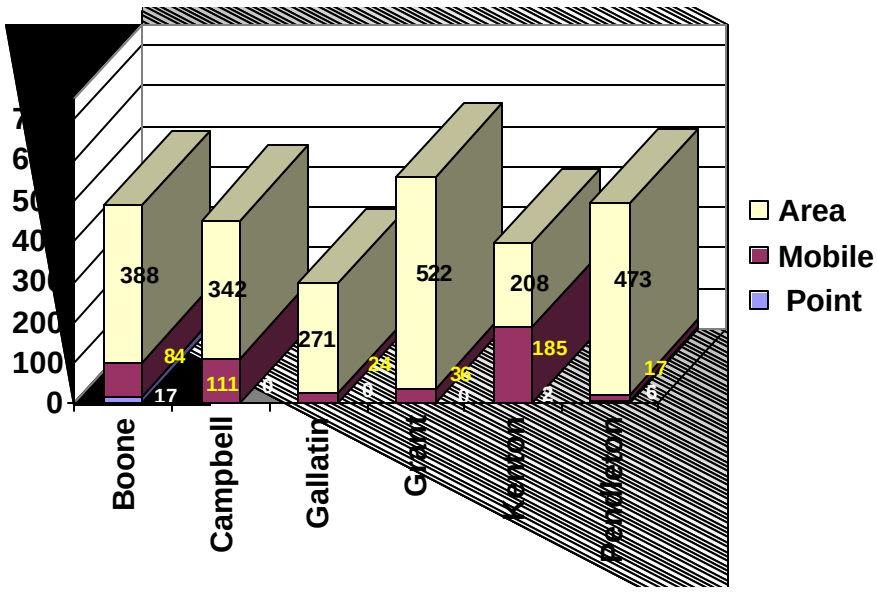
## 1999 NEI $NO_x$ Contribution
(tons per year)



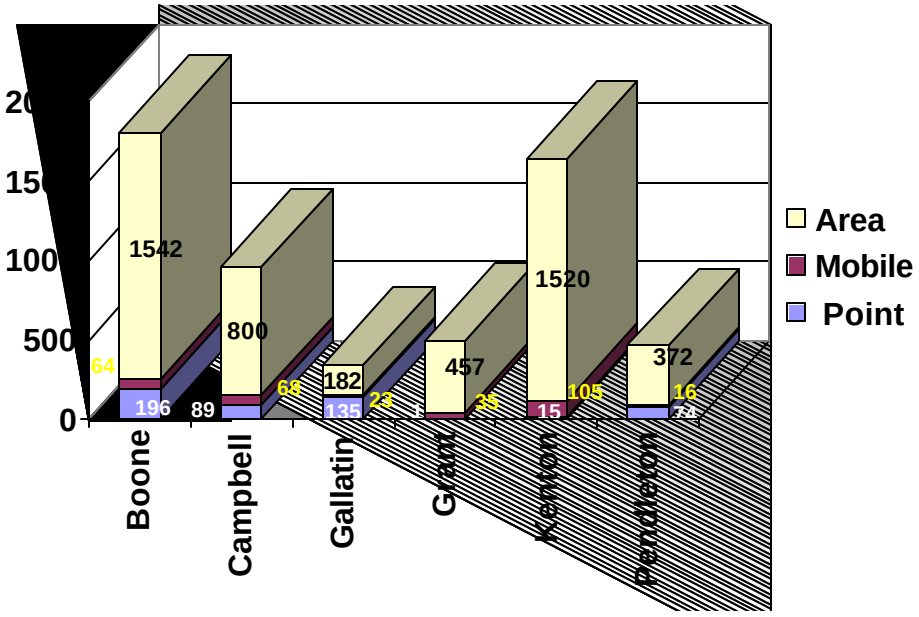

## 1999 NEI $SO_x$ Contribution
(tons per year)



## 1999 NEI $NH_3$ Contribution
(tons per year)




## 1999 NEI $PM_{2.5}$ Contribution
(tons per year)



## Conclusion and Recommendation

For the 2001 – 2003 monitoring period, the Kenton County $PM_{2.5}$ monitor shows an average annual design value of 14.9 micrograms per cubic meter, which achieves the National Ambient Air Quality Standard (NAAQS) and should be classified as a county in attainment. As well, for the 2001 – 2003 monitoring period, the Campbell County $PM_{2.5}$ monitor directly to the east shows an average annual design value of 13.9 micrograms per cubic meter, which is also in attainment of the standard.

Additionally, the emissions from Kenton County compared to the remainder of the MSA are negligible and do not significantly contribute to the $PM_{2.5}$ violations in the MSA. Kenton County contributes approximately 9% of the total VOC emissions, 3% of the total $NO_x$ emissions, less than 0.5% of the total $SO_x$ emissions, 4% of the total $NH_3$ emissions and 5% of the total $PM_{2.5}$ emissions in the entire MSA.

Therefore, based on the monitoring and emissions data, Kenton County should be designated attainment for the $PM_{2.5}$ standard.

# GALLATIN COUNTY, KENTUCKY

Gallatin County is part of the Cincinnati-Middletown, OH-KY-IN Metropolitan Statistical Area (MSA) and is located to the southwest of Boone County, Kentucky, and to the northwest of Owen and Grant Counties, Kentucky.

## Geography/Topography

Gallatin County has a land area of 98 square miles and is located on the banks of the Ohio River in the tri-state area of Kentucky, Ohio and Indiana.

## Meteorological Information

Due to the close proximity of Cincinnati, Ohio, meteorological data from Cincinnati was used for this Kentucky area. Wind speed/wind direction information shows that the majority of the time for the period 1988–1992, the wind in the Gallatin County area came from the southwest and typically from 7-10 knots. (See figure 1-A) The mean high temperature for July for the area from 1961 through 1990 was 86?F, the mean low was 66?F. The mean precipitation for the same period was 3.8 inches.

## Planning

The authority for air quality planning in the Gallatin County area resides with the Kentucky Environmental and Public Protection Cabinet. Transportation planning for Gallatin County is performed by the Kentucky Transportation Cabinet.

## Air Monitoring

For the 2001 – 2003 monitoring period, there were no $PM_{2.5}$ monitors located in Gallatin County. However, the Kenton County monitor to the east northeast shows an average annual design value of 14.9 micrograms per cubic meter, which achieves the $PM_{2.5}$ annual National Ambient Air Quality Standard (NAAQS - 15 micrograms per cubic meter) and is classified as a county in attainment. In addition, the Campbell County monitor further to the east shows an average annual design value of 13.9 micrograms per cubic meter, which also achieves the standard and is classified as attainment. However, because the Ohio monitors in Hamilton and Butler Counties across the Ohio River have probable $PM_{2.5}$ design values that exceed the annual $PM_{2.5}$ standard, information for Gallatin County is being presented in this document. The monitoring information for 2003 is complete for the Kentucky counties. However, the

2003 monitoring data reported for the Ohio counties is the latest available and may not be complete through December. (See table 1-A)

**Population**

Based on projections to 2002 from the 2000 census data, there are 7,836 persons living in Gallatin County. (See table 1-C) That represents approximately 80 persons per square mile. The population of Gallatin County is approximately 100% rural with few people living in incorporated areas. The largest cities in Gallatin County are Warsaw and Glencoe.

Gallatin County's population from 1990 through 2000 increased by approximately 46% (5,393 to 7,870). The population is further expected to increase by an additional 48% between 2000 and 2010. (See table 1-B)

For the entire Cincinnati-Middletown, OH-KY-IN MSA, Gallatin County represents less than 0.5% of the total population in the MSA and 2% of the Kentucky portion of the MSA. (See table 1-C)

**Air Emissions**

The emissions presented in this document are from the U.S. EPA's 1999 National Emission Inventory (NEI). In addition, the $PM_{2.5}$ emissions provided in this document are for primary $PM_{2.5}$ from the 1999 NEI. Primary $PM_{2.5}$ is directly emitted from a stack or an open source and includes filterable and condensible particles.

**Point Sources**

Point source VOC emissions from Gallatin County were estimated at 144 tons per year in 1999, which represents approximately 8% of the total 1,752 tpy of overall VOC point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Point source $NO_x$ emissions from Gallatin County were estimated at 411 tons per year in 1999, which represents approximately 3% of the total 12,289 tpy of the $NO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

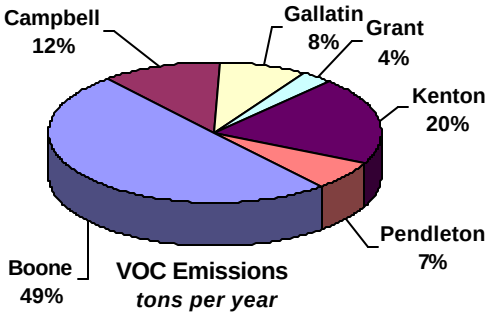
Point source $SO_x$ emissions from Gallatin County were estimated at 142 tons per year in 1999, which represents less than 1% of the total 18,635 tpy overall $SO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

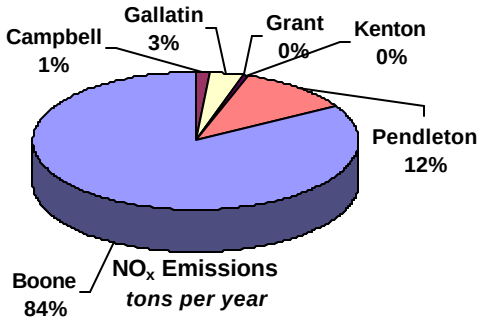
Point source $NH_3$ emissions from Gallatin County were estimated at 0 tons per year in 1999. (See table 1-F)

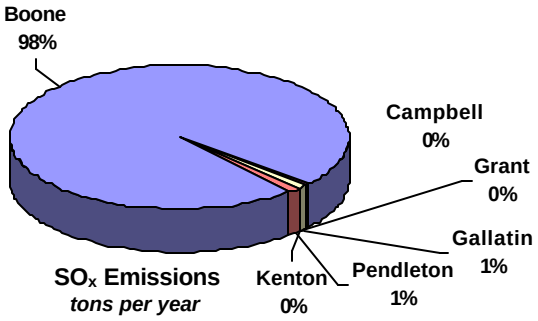
Point source $PM_{2.5}$ emissions from Gallatin County were estimated at 135 tons per year in 1999, which represents approximately 26% of the total 510 tpy

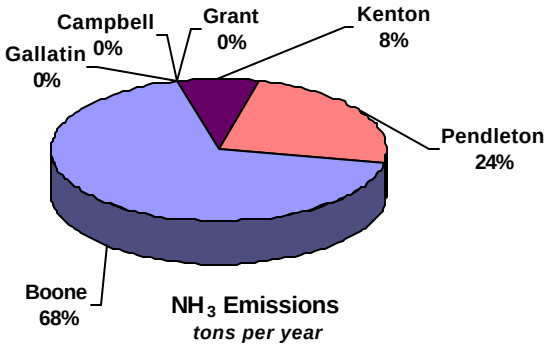
overall $PM_{2.5}$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

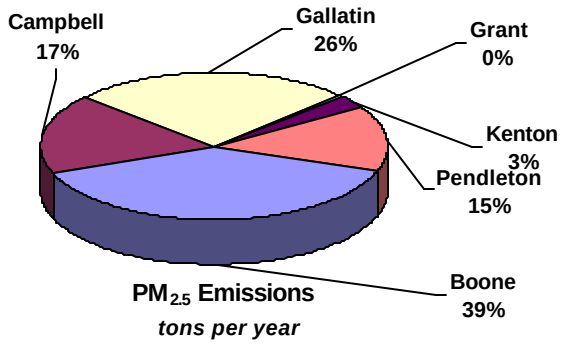
## 1999 NEI Northern Kentucky Point Source Emissions (tons per year)




Point sources located within Gallatin County are subject to PSD requirements, CTG RACT requirements, Maximum Achievable Control Technology (MACT) requirements for sources of Hazardous Air Pollutants, and New Source

Performance Standards (NSPS). Any controls imposed as a result of previous nonattainment designations are required to remain in Gallatin County.

**Onroad Mobile**

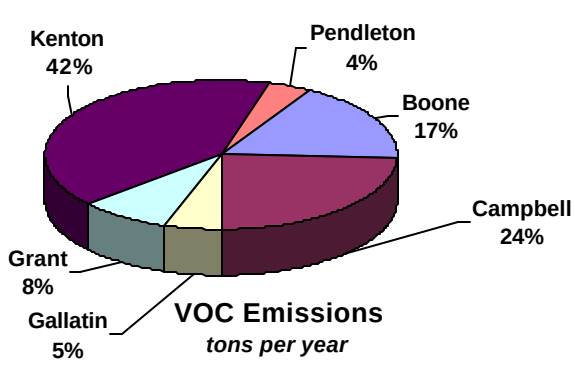
Onroad mobile source VOC emissions from Gallatin County were estimated at 460 tons per year in 1999, which represents approximately 5% of the total 8,505 tpy of overall VOC onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Onroad mobile source $NO_x$ emissions from Gallatin County were estimated at 1,058 tons per year in 1999, which represents approximately 7% of the total 14,441 tons per year of overall $NO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

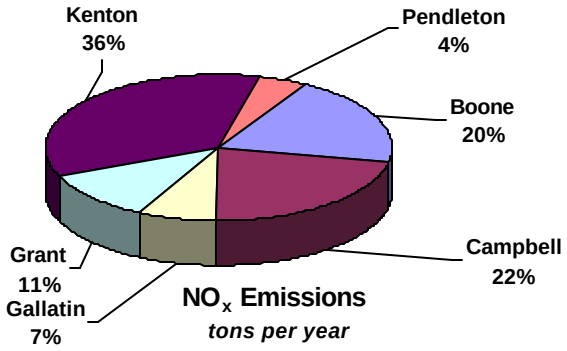
Onroad mobile source $SO_x$ emissions from Gallatin County were estimated at 34 tons per year in 1999, which represents approximately 6% of the total 546 tpy of overall $SO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

Onroad mobile source $NH_3$ emissions from Gallatin County were estimated at 24 tons per year in 1999, which represents approximately 5% of the total 457 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

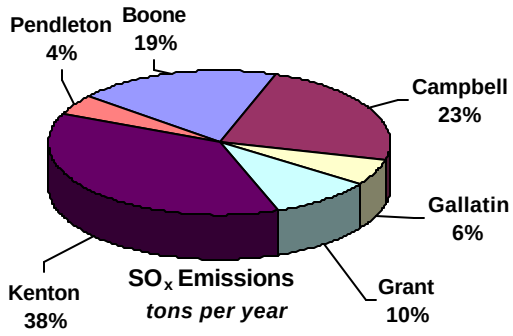
Onroad mobile source $PM_{2.5}$ emissions from Gallatin County were estimated at 23 tons per year in 1999, which represents approximately 7% of the total 311 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

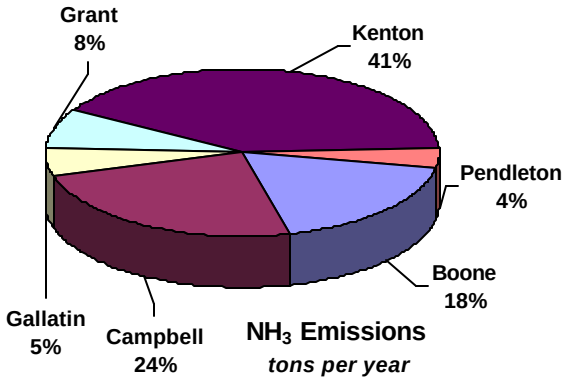
**1999 NEI Northern Kentucky**
**Onroad Mobile Source Emissions**
**(tons per year)**

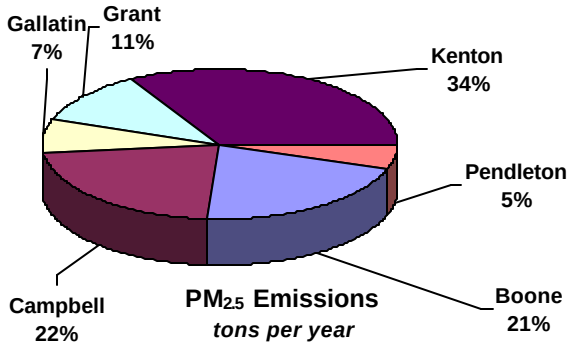


## 1999 NEI Northern Kentucky
## Onroad Mobile Source Emissions
***(continued)***




Based on information obtained from the Kentucky Transportation Cabinet, commuting traffic from other counties into Gallatin County is 46% and classified as high, and the commuting traffic from Gallatin County into other counties is significant at 63%.

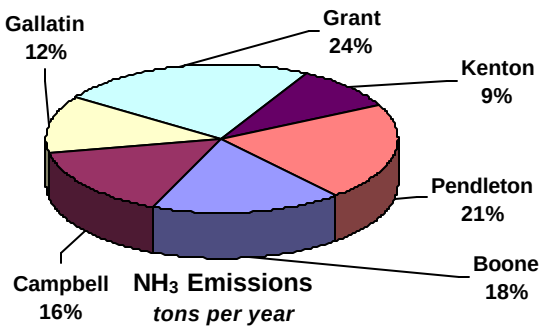
| Commuting Classifications | |
|---|---|
| Not Significant | 0-10% |
| Minimal | 11-30% |
| High | 31-50% |
| Significant | 51% or more |

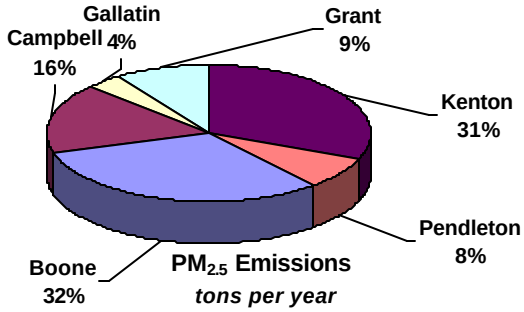
### Area Sources

Area source $NH_3$ emissions from Gallatin County were estimated at 271 tons per year in 1999, which represents approximately 12% of the total 2,204 tpy of overall $NH_3$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

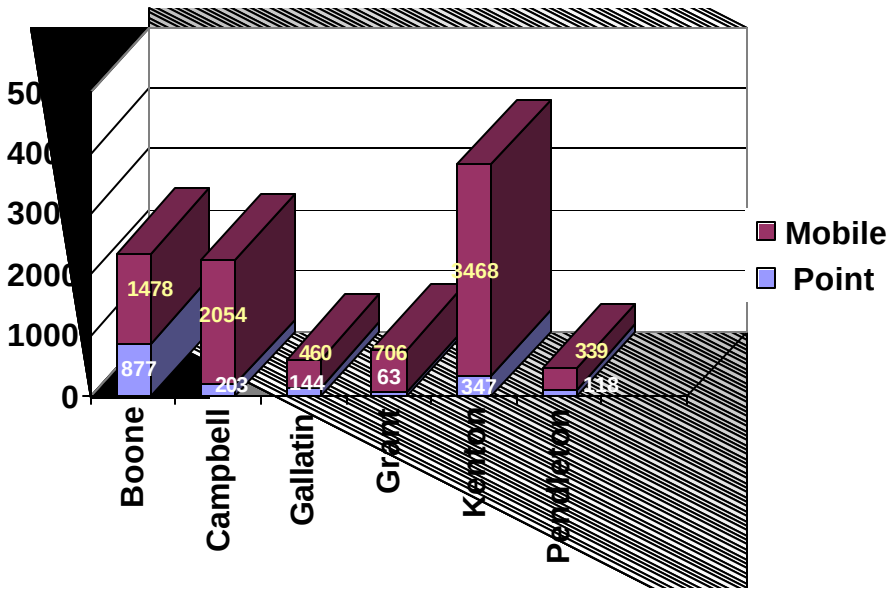
Area source $PM_{2.5}$ emissions from Gallatin County were estimated at 182 tons per year in 1999, which represents approximately 4% of the total 4,873 tpy of overall $PM_{2.5}$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

## 1999 NEI Cincinnati-Hamilton MSA Area Source Emissions
**(tons per year)**

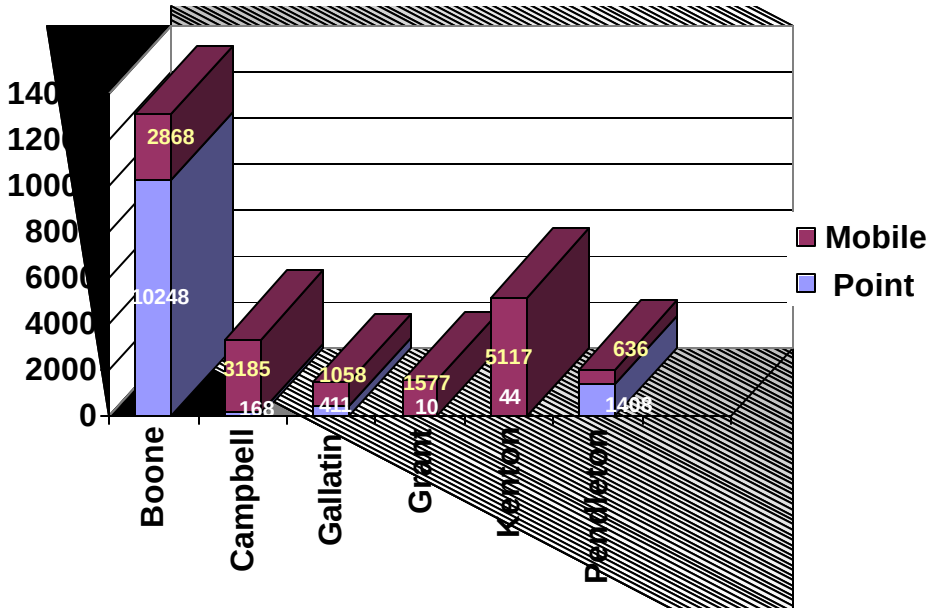


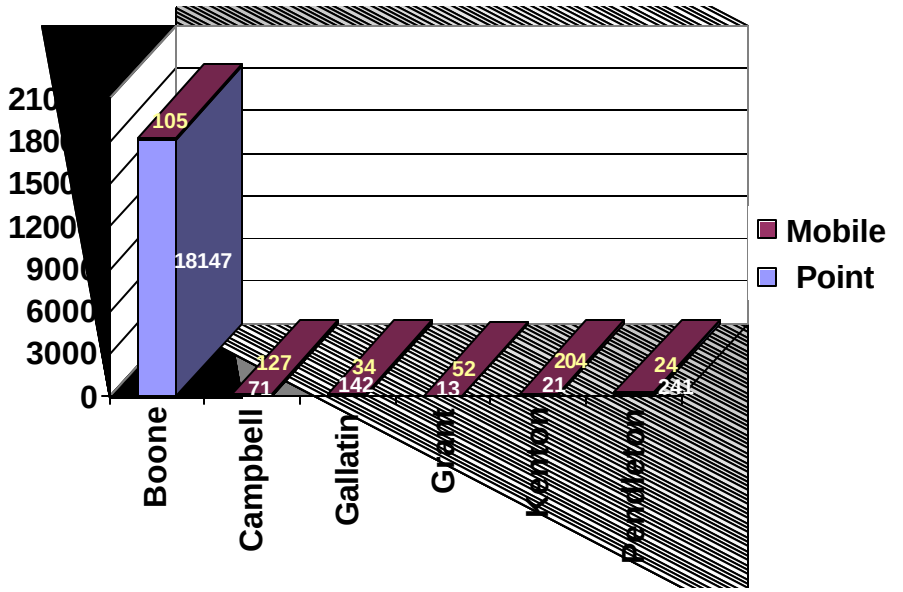

## 1999 NEI VOC Contribution
**(tons per year)**



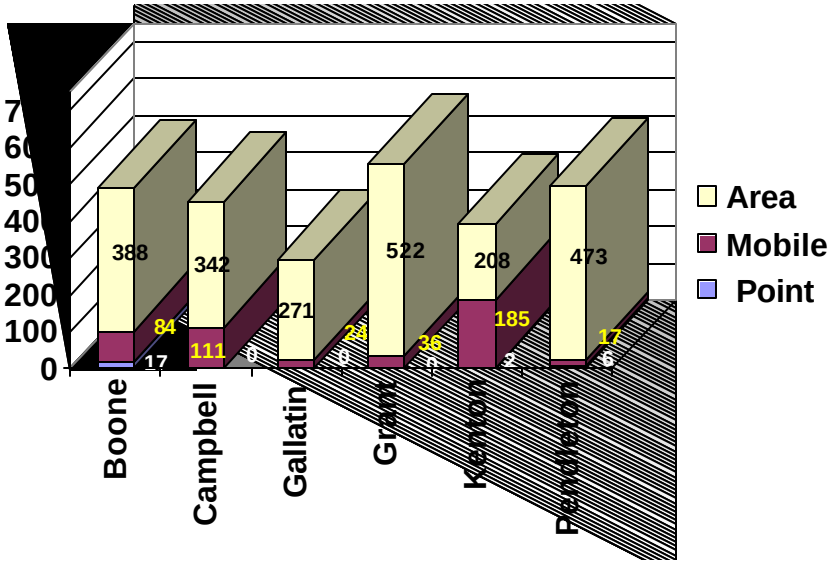
## 1999 NEI $NO_x$ Contribution
(tons per year)



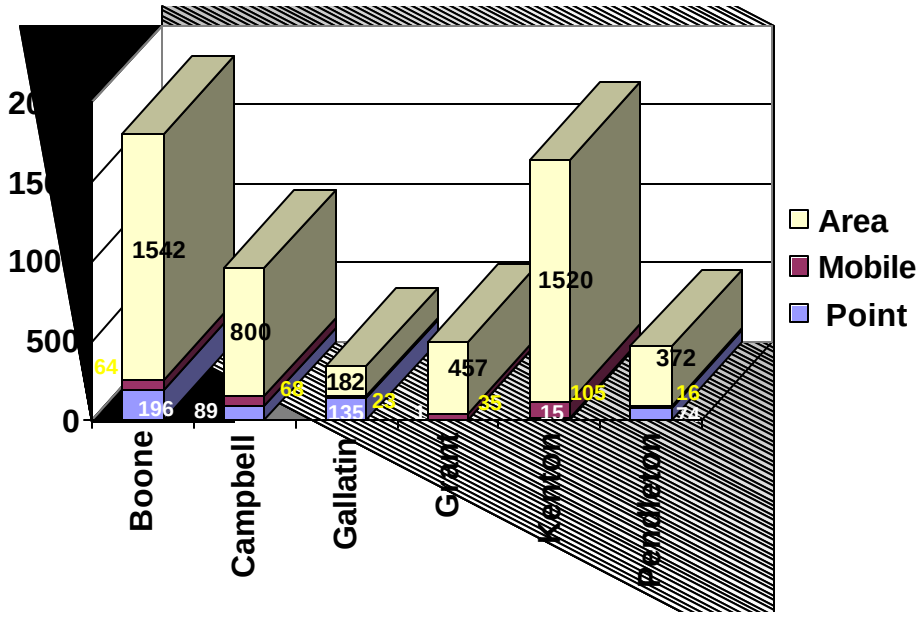

## 1999 NEI $SO_x$ Contribution
(tons per year)



## 1999 NEI $NH_3$ Contribution
(tons per year)




## 1999 NEI $PM_{2.5}$ Contribution
(tons per year)



## Conclusion and Recommendation

For the 2001 – 2003 monitoring period, there were no $PM_{2.5}$ monitors located in Gallatin County. However, for the 2001 – 2003 monitoring period, the Kenton County $PM_{2.5}$ monitor directly to the northeast shows an average annual design value of 14.9 micrograms per cubic meter, which achieves the National Ambient Air Quality Standard (NAAQS) and is classified as a county in attainment. As well, for the 2001 – 2003 monitoring period, the Campbell County $PM_{2.5}$ monitor further to the northeast shows an average annual design value of 13.9 micrograms per cubic meter, which is also in attainment of the standard.

Additionally, the emissions from Gallatin County compared to the remainder of the MSA are negligible and do not significantly contribute to the $PM_{2.5}$ violations in the MSA. Gallatin County contributes approximately 1% of the total $NO_x$ emissions, 0% of the total $SO_x$ emissions, 3% of the total $NH_3$ emissions and 1% of the total $PM_{2.5}$ emissions in the MSA.

Therefore, based on the monitoring and emissions data, Gallatin County should be designated attainment for the $PM_{2.5}$ standard.

# GRANT COUNTY, KENTUCKY

Grant County is part of the Cincinnati-Middletown, OH-KY-IN Metropolitan Statistical Area (MSA) and is located to the southeast of Gallatin County, Kentucky, to the west of Pendleton County, Kentucky, and directly north of Scott County, Kentucky.

## Geography/Topography

Grant County has a land area of 259 square miles and is located in the tri-state area of Kentucky, Ohio and Indiana. This north central section of Kentucky is the Outer Blue Grass Region.

## Meteorological Information

Due to the close proximity of Cincinnati, Ohio, meteorological data from Cincinnati was used for this Kentucky area. Wind speed/wind direction information shows that the majority of the time for the period 1988–1992, the wind in the Grant County area came from the southwest and typically from 7-10 knots. (See figure 1-A) The mean high temperature for July for the area from 1961 through 1990 was 86?F, the mean low was 66?F. The mean precipitation for the same period was 3.8 inches.

## Planning

The authority for air quality planning in the Grant County area resides with the Kentucky Environmental and Public Protection Cabinet. Transportation planning for Grant County is performed by the Kentucky Transportation Cabinet.

## Air Monitoring

For the 2001 – 2003 monitoring period, there were no $PM_{2.5}$ monitors located in Grant County. However, the Kenton County monitor to the east northeast shows an average annual design value of 14.9 micrograms per cubic meter, which achieves the $PM_{2.5}$ annual National Ambient Air Quality Standard (NAAQS - 15 micrograms per cubic meter) and is classified as a county in attainment. In addition, the Campbell County monitor further to the east shows an average annual design value of 13.9 micrograms per cubic meter, which also achieves the standard and is classified as attainment. However, because the Ohio monitors in Hamilton and Butler Counties across the Ohio River have probable $PM_{2.5}$ design values that exceed the annual $PM_{2.5}$ standard, information for Grant County is being presented in this document. The monitoring information

for 2003 is complete for the Kentucky counties. However, the 2003 monitoring data reported for the Ohio counties is the latest available and may not be complete through December. (See table 1-A)

## Population

Based on projections to 2002 from the 2000 census data, there are 23,620 persons living in Grant County. That represents approximately 91 persons per square mile. The population of Grant County is approximately 78% rural with the remaining 22% living in incorporated areas. The largest cities in Grant County are Williamstown and Dry Ridge. (See table 1-C)

Grant County's population from 1990 through 2000 increased by approximately 42.2% (15,737 to 22,384). The population is further expected to increase by an additional 44.5% between 2000 and 2010. (See table 1-B)

For the entire Cincinnati-Hamilton MSA, Grant County represents approximately 1.2% of the total population in the MSA and 6.2% of the Kentucky portion of the MSA. (See table 1-C)

## Air Emissions

The emissions presented in this document are from the U.S. EPA's 1999 National Emission Inventory (NEI). In addition, the $PM_{2.5}$ emissions provided in this document are for primary $PM_{2.5}$ from the 1999 NEI. Primary $PM_{2.5}$ is directly emitted from a stack or an open source and includes filterable and condensible particles.

## Point Sources

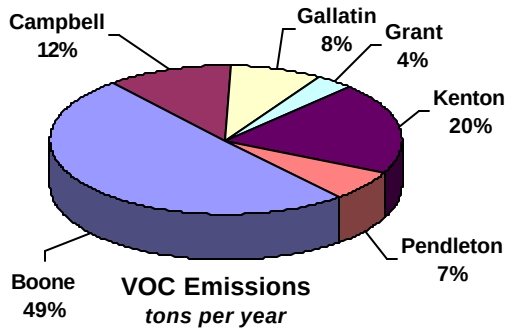
Point source VOC emissions from Grant County were estimated at 63 tons per year in 1999, which represents approximately 4% of the total 1,752 tpy of overall VOC point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Point source $NO_x$ emissions from Grant County were estimated at 10 tons per year in 1999, which represents less than 1% of the total 12,289 tons per year of the $NO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

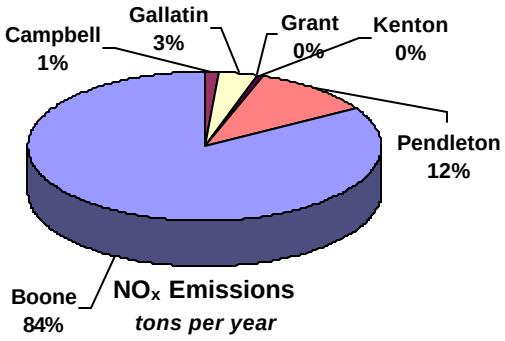
Point source $SO_x$ emissions from Grant County were estimated at 13 tons per year in 1999, which represents less than 1% of the total 18,635 tpy overall $SO_x$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

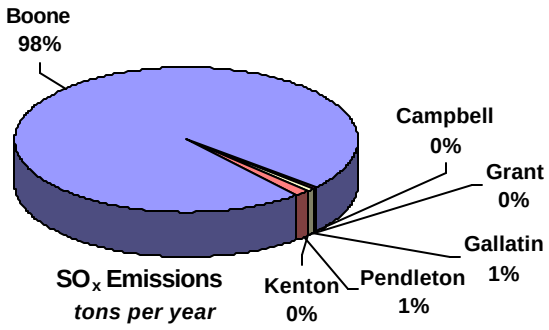
Point source $NH_3$ emissions from Grant County were estimated at 0 tons per year in 1999. (See Table 1-F)

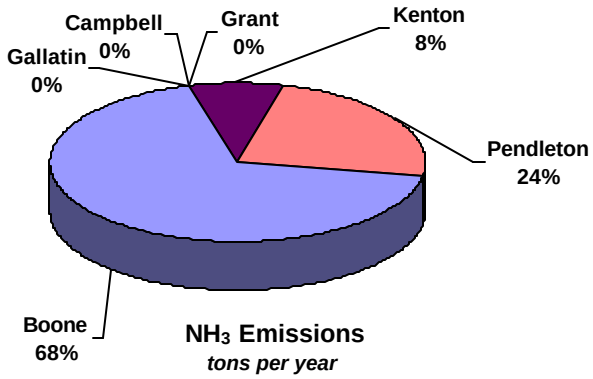
Point source $PM_{2.5}$ emissions from Grant County were estimated at 1 ton per year in 1999, which represents less than 1% of the total 510 tpy overall $PM_{2.5}$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

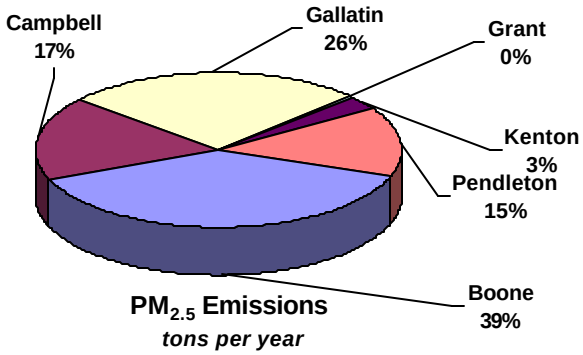
## 1999 NEI Northern Kentucky Point Source Emissions
### (tons per year)



Point sources located within Grant County are subject to PSD requirements, CTG RACT requirements, Maximum Achievable Control Technology (MACT) requirements for sources of Hazardous Air Pollutants, and New Source Performance Standards (NSPS). Any controls imposed as a result of previous nonattainment designations are required to remain in Grant County.

**Onroad Mobile**

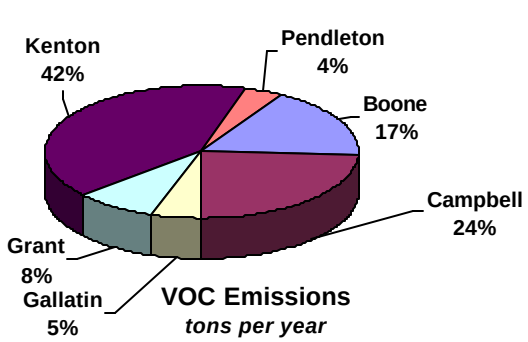
Onroad mobile source VOC emissions from Grant County were estimated at 706 tons per year in 1999, which represents approximately 8% of the total 8,505 tpy of overall VOC onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Onroad mobile source $NO_x$ emissions from Grant County were estimated at 1,577 tons per year in 1999, which represents approximately 11% of the total 14,441 tons per year of overall $NO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

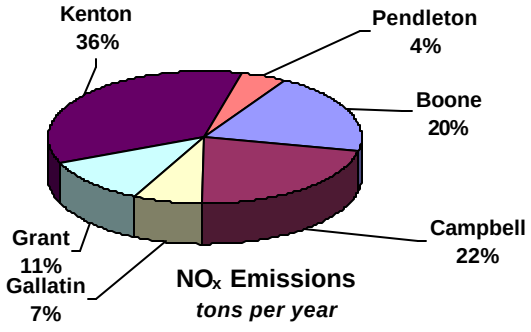
Onroad mobile source $SO_x$ emissions from Grant County were estimated at 52 tons per year in 1999, which represents approximately 10% of the total 546 tpy of overall $SO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

Onroad mobile source $NH_3$ emissions from Grant County were estimated at 36 tons per year in 1999, which represents approximately 8% of the total 457 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

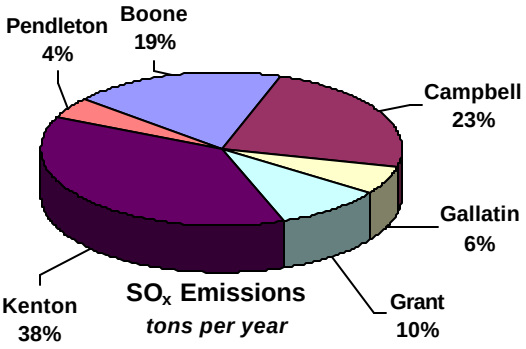
Onroad mobile source $PM_{2.5}$ emissions from Grant County were estimated at 35 tons per year in 1999, which represents approximately 11% of the total 311 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

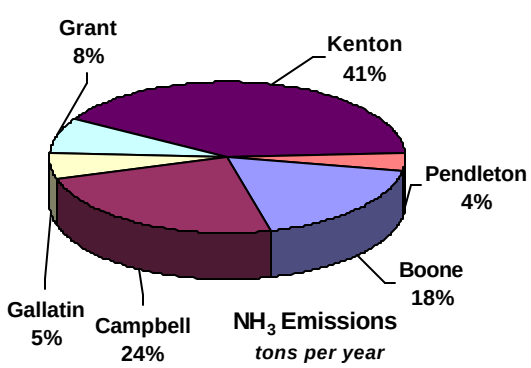
**1999 NEI Northern Kentucky**
**Onroad Mobile Source Emissions**
**(tons per year)**

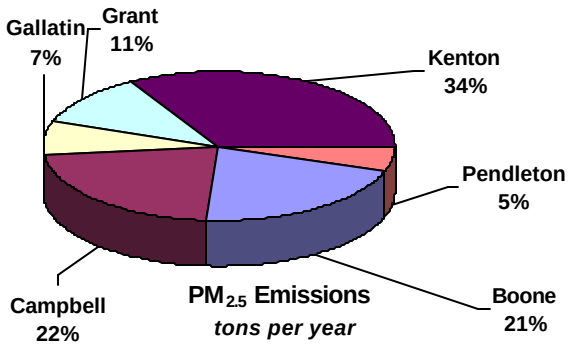


## 1999 NEI Northern Kentucky
## Onroad Mobile Source Emissions
## (*continued*)




Based on information obtained from the Kentucky Transportation Cabinet, commuting traffic from other counties into Grant County is 29.5% and classified as minimal, and the commuting traffic from Grant County into other counties is significant at 59.3%.

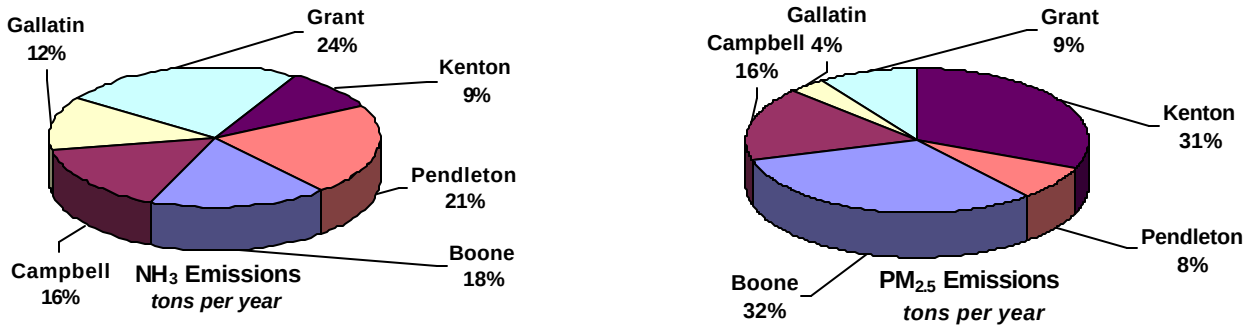
| Commuting Classifications | |
|---|---|
| Not Significant | 0-10% |
| Minimal | 11-30% |
| High | 31-50% |
| Significant | 51% or more |

Area Sources

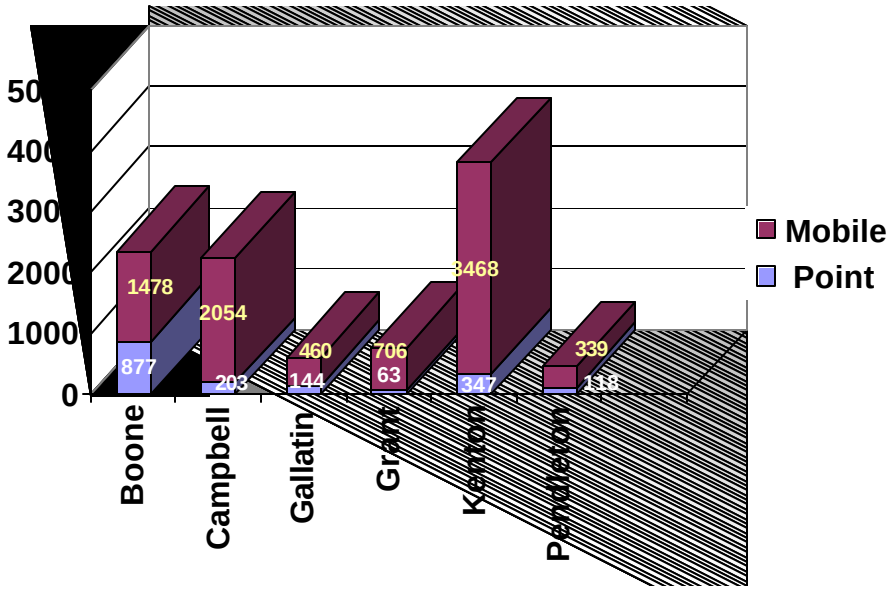
Area source $NH_3$ emissions from Grant County were estimated at 522 tons per year in 1999, which represents approximately 24% of the total 2,204 tpy of overall $NH_3$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

Area source $PM_{2.5}$ emissions from Grant County were estimated at 457 tons per year in 1999, which represents approximately 9% of the total 4,873 tpy of overall $PM_{2.5}$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

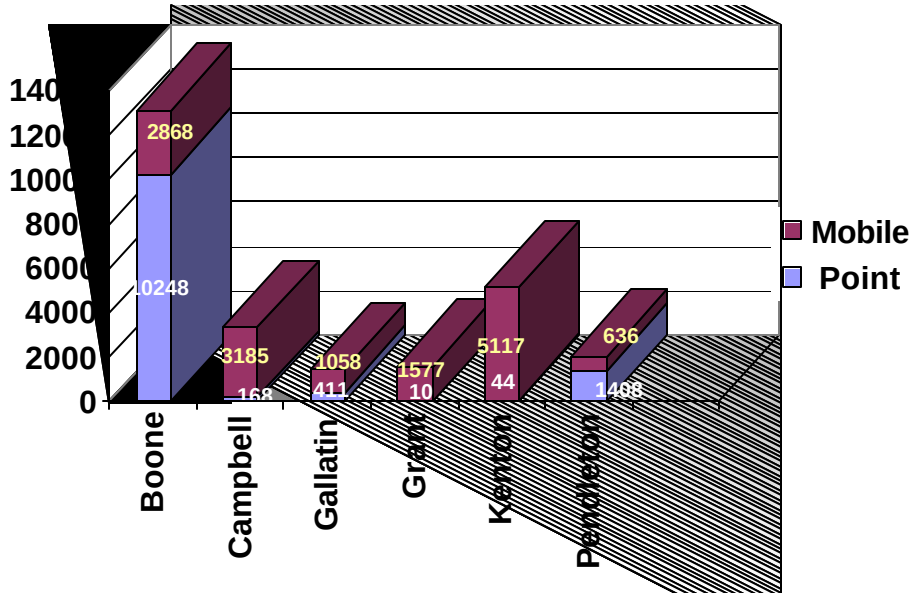
**1999 NEI Cincinnati-Hamilton MSA**
**Area Source Emissions**
**(tons per year)**



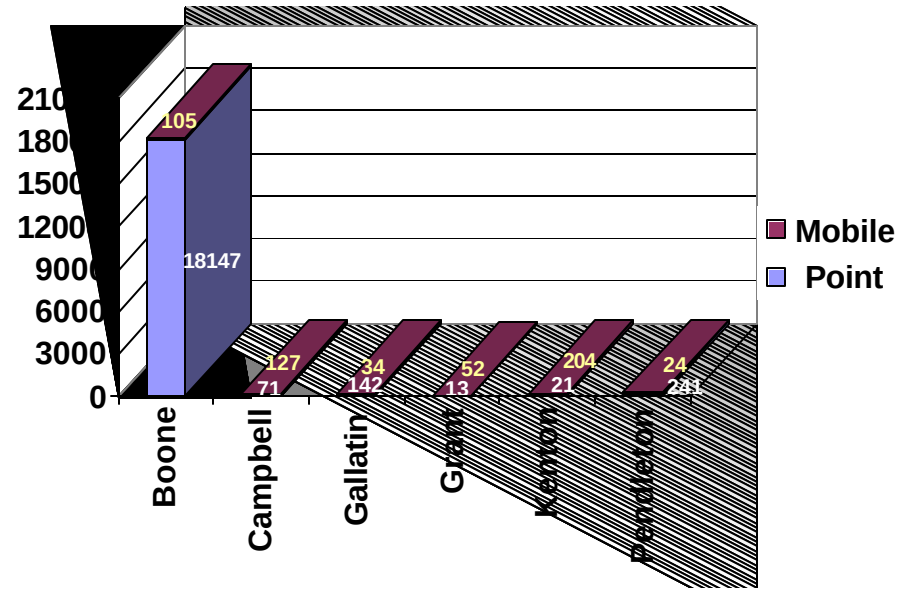

**1999 NEI VOC Contribution**
**(tons per year)**



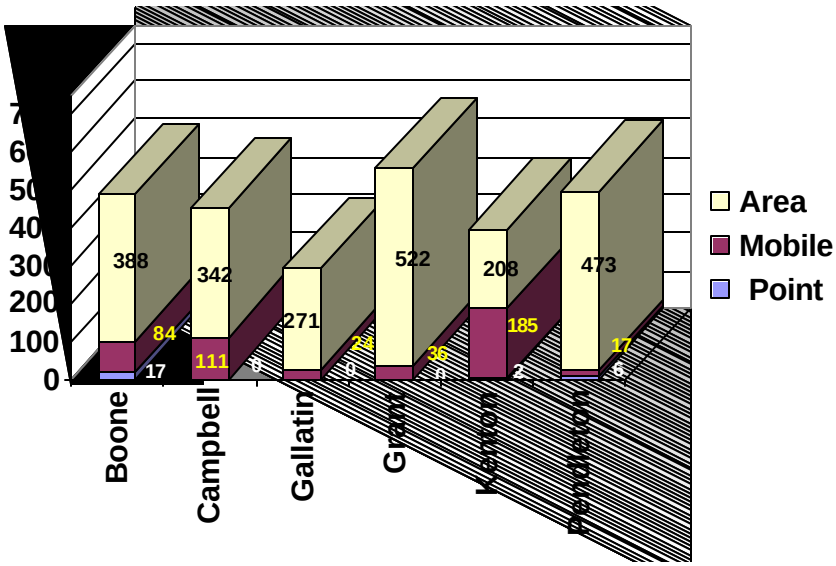
## 1999 NEI $NO_x$ Contribution
(tons per year)



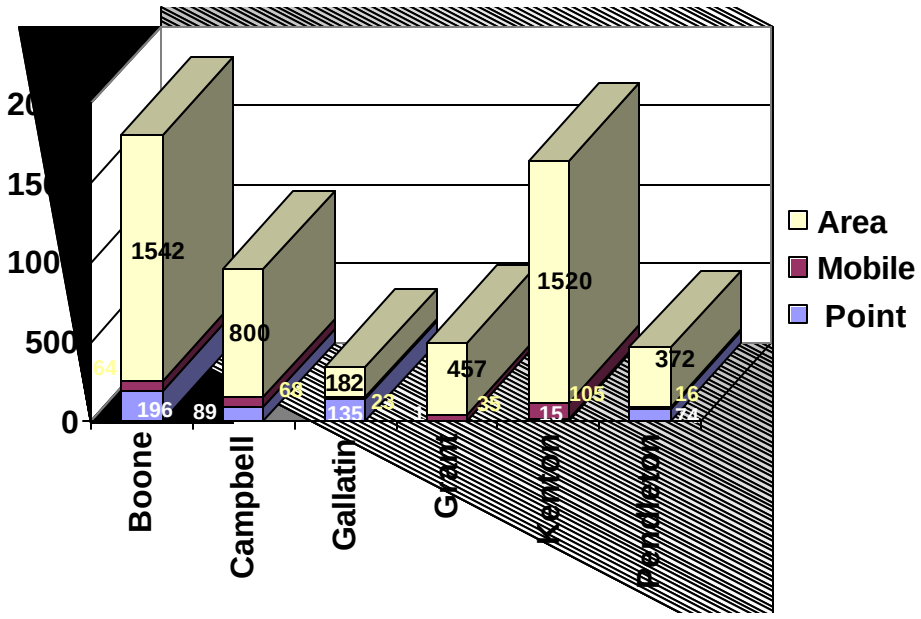

## 1999 NEI $SO_x$ Contribution
(tons per year)



## 1999 NEI $NH_3$ Contribution
(tons per year)




## 1999 NEI $PM_{2.5}$ Contribution
(tons per year)



## Conclusion and Recommendation

For the 2001 – 2003 monitoring period, there were no $PM_{2.5}$ monitors located in Grant County. However, for the 2001 – 2003 monitoring period, the Kenton County $PM_{2.5}$ monitor directly to the northeast shows an average annual design value of 14.9 micrograms per cubic meter, which achieves the National Ambient Air Quality Standard (NAAQS) and is classified as a county in attainment. As well, for the 2001 – 2003 monitoring period, the Campbell County $PM_{2.5}$ monitor further to the northeast shows an average annual design value of 13.9 micrograms per cubic meter, which is also in attainment of the standard.

Additionally, the emissions from Grant County compared to the remainder of the MSA are negligible and do not significantly contribute to the $PM_{2.5}$ violations in the MSA. Grant County contributes approximately 1% of the total $NO_x$ emissions, less than 0.5% of the total $SO_x$ emissions, 6% of the total $NH_3$ emissions and 2% of the total $PM_{2.5}$ emissions in the MSA.

Therefore, based on the monitoring and emissions data Grant County should be designated attainment for the $PM_{2.5}$ standard.

# PENDLETON COUNTY, KENTUCKY

Pendleton County is part of the Cincinnati-Middletown, OH-KY-IN Metropolitan Statistical Area (MSA) and is located directly south of Kenton and Campbell Counties, Kentucky, and to the east of Grant County, Kentucky.

## Geography/Topography

Pendleton County has a land area of 280 square miles and is located on the banks of the Ohio River in the tri-state area of Kentucky, Ohio and Indiana. The Licking River flows northward through the central area of the county.

## Meteorological Information

Due to the close proximity of Cincinnati, Ohio, meteorological data from Cincinnati was used for this Kentucky area. Wind speed/wind direction information shows that the majority of the time for the period 1988–1992, the wind in the Pendleton County area came from the southwest and typically from 7-10 knots. (See figure 1-A) The mean high temperature for July for the area from 1961 through 1990 was 86?F, the mean low was 66?F. The mean precipitation for the same period was 3.8 inches.

## Planning

The authority for air quality planning in the Pendleton County area resides with the Kentucky Environmental and Public Protection Cabinet. Transportation planning for Pendleton County is performed by the Kentucky Transportation Cabinet.

## Air Monitoring

For the 2001 – 2003 monitoring period, there were no $PM_{2.5}$ monitors located in Pendleton County. However, the Kenton County monitor to the east northeast shows an average annual design value of 14.9 micrograms per cubic meter, which achieves the $PM_{2.5}$ annual National Ambient Air Quality Standard (NAAQS - 15 micrograms per cubic meter) and is classified as a county in attainment. In addition, the Campbell County monitor further to the east shows an average annual design value of 13.9 micrograms per cubic meter, which also achieves the standard and is classified as attainment. However, because the Ohio monitors in Hamilton and Butler Counties across the Ohio River have probable $PM_{2.5}$ design values that exceed the annual $PM_{2.5}$ standard, information for Pendleton County is being presented in this document. The monitoring information for 2003 is complete for the Kentucky counties. However, the

2003 monitoring data reported for the Ohio counties is the latest available and may not be complete through December. (See table 1-A)

**Population**

Based on projections to 2002 from the 2000 census data, there are 14,815 persons living in Pendleton County. (See table 1-C) That represents approximately 53 persons per square mile. The population of Pendleton County is approximately 100% rural with few people living in incorporated areas. The largest cities in Pendleton County are Falmouth and Butler.

Pendleton County's population from 1990 through 2000 increased by approximately 20% (12,036 to 14,390). The population is further expected to increase by an additional 23% between 2000 and 2010. (See table 1-B)

For the entire Cincinnati-Hamilton, OH-KY-IN MSA, Pendleton County represents approximately 0.7% of the total population in the MSA and 3.9% of the Kentucky portion of the MSA. (See table 1-C)

**Air Emissions**

The emissions presented in this document are from the U.S. EPA's 1999 National Emission Inventory (NEI). In addition, the $PM_{2.5}$ emissions provided in this document are for primary $PM_{2.5}$ from the 1999 NEI. Primary $PM_{2.5}$ is directly emitted from a stack or an open source and includes filterable and condensible particles.

**Point Sources**

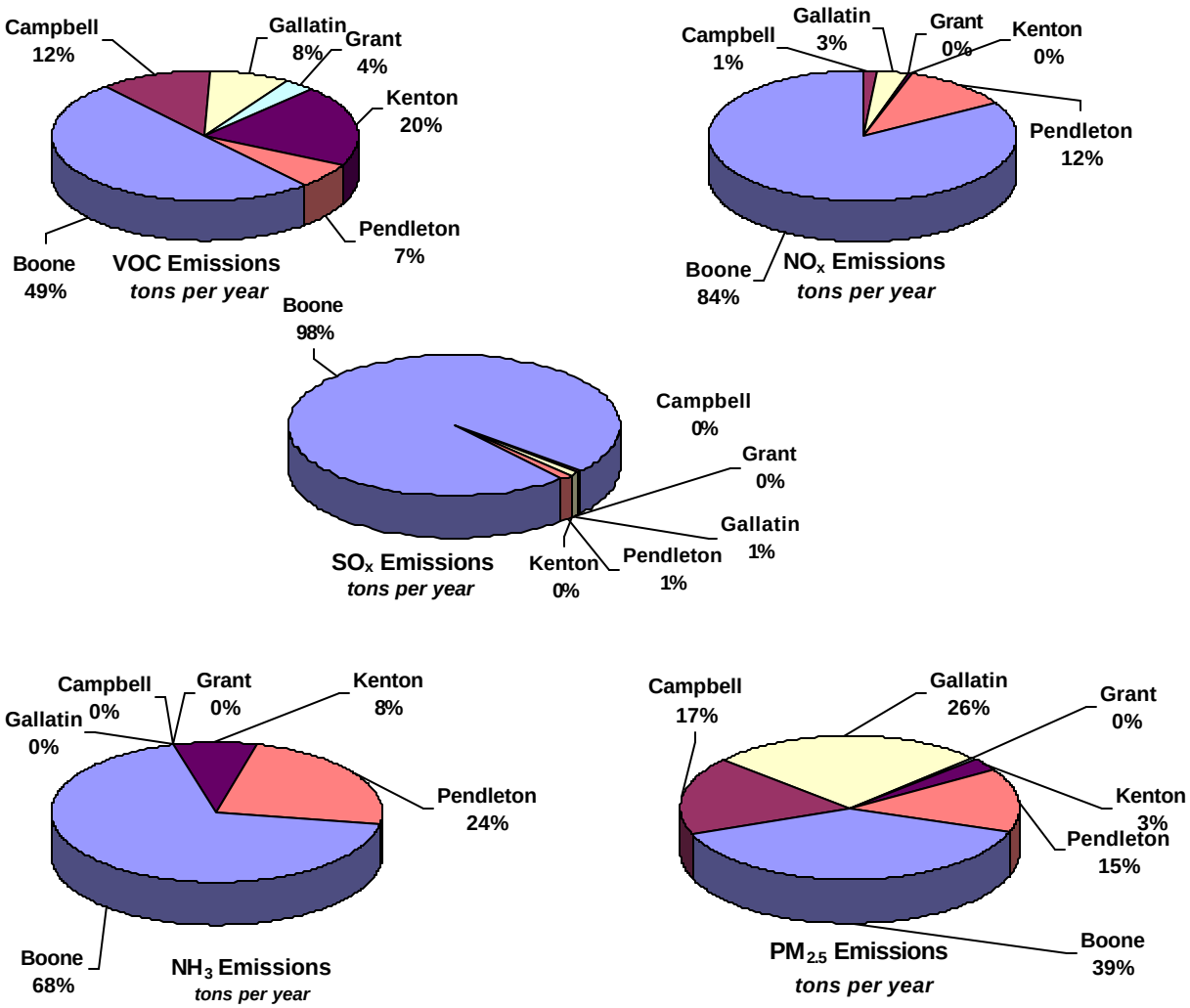
Point source VOC emissions from Pendleton County were estimated at 118 tons per year in 1999, which represents approximately 7% of the total 1,752 tpy of overall VOC point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Point source $NO_X$ emissions from Pendleton County were estimated at 1,408 tons per year in 1999, which represents approximately 12% of the total 12,289 tpy of the $NO_X$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

Point source $SO_X$ emissions from Pendleton County were estimated at 241 tons per year in 1999, which represents less than 1% of the total 18,635 tpy overall $SO_X$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See Table 1-E)

Point source $NH_3$ emissions from Pendleton County were estimated at 6 tons per year in 1999, which represents 24% of the total 25 tpy overall $NH_3$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

Point source $PM_{2.5}$ emissions from Pendleton County were estimated at 74 tons per year in 1999, which represents approximately 15% of the total 510 tpy overall $PM_{2.5}$ point source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

## 1999 NEI Northern Kentucky Point Source Emissions (tons per year)




Point sources located within Pendleton County are subject to PSD requirements, CTG RACT requirements, Maximum Achievable Control Technology (MACT) requirements for sources of Hazardous Air Pollutants, and New Source Performance Standards (NSPS). Any controls imposed as a result of previous nonattainment designations are required to remain in Pendleton County.

**Onroad Mobile**

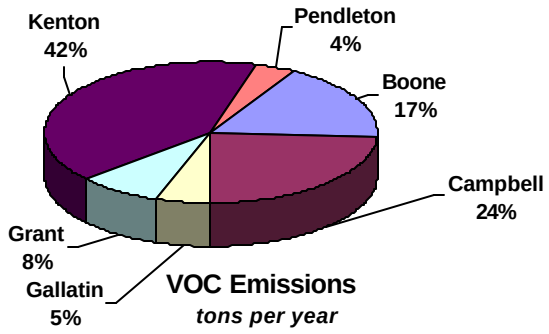
Onroad mobile source VOC emissions from Pendleton County were estimated at 339 tons per year in 1999, which represents approximately 4% of the total 8,505 tpy of overall VOC onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. Onroad mobile source $NO_x$ emissions from Pendleton County were estimated at 636 tons per year in 1999, which represents approximately 4% of the total 14,441 tons per year of overall $NO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-D)

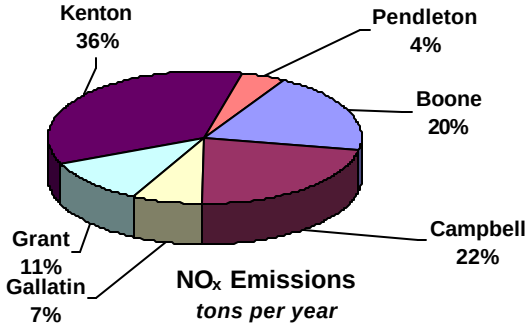
Onroad mobile source $SO_x$ emissions from Pendleton County were estimated at 24 tons per year in 1999, which represents approximately 4% of the total 546 tpy of overall $SO_x$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-E)

Onroad mobile source $NH_3$ emissions from Pendleton County were estimated at 17 tons per year in 1999, which represents approximately 4% of the total 457 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

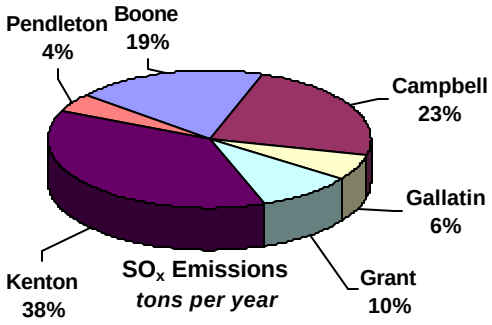
Onroad mobile source $PM_{2.5}$ emissions from Pendleton County were estimated at 16 tons per year in 1999, which represents approximately 5% of the total 311 tpy of overall $NH_3$ onroad mobile source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

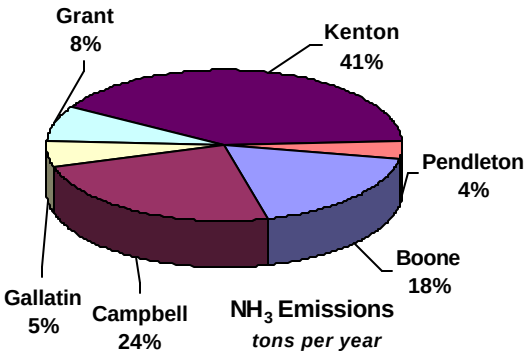
**1999 NEI Northern Kentucky**
**Onroad Mobile Source Emissions**
**(tons per year)**

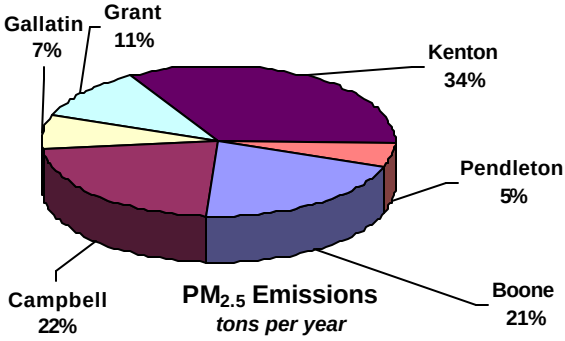


## 1999 NEI Northern Kentucky
## Onroad Mobile Source Emissions
## (*continued*)



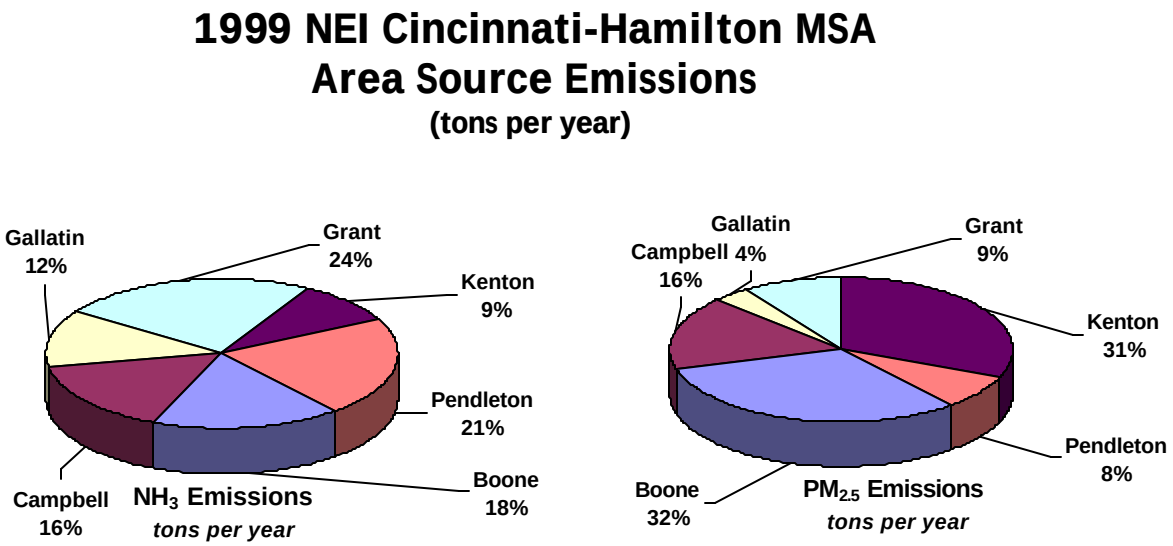

Based on information obtained from the Kentucky Transportation Cabinet, commuting traffic from other counties into Pendleton County is 27% and classified as minimal, and the commuting traffic from Pendleton County into other counties is significant at 62%.

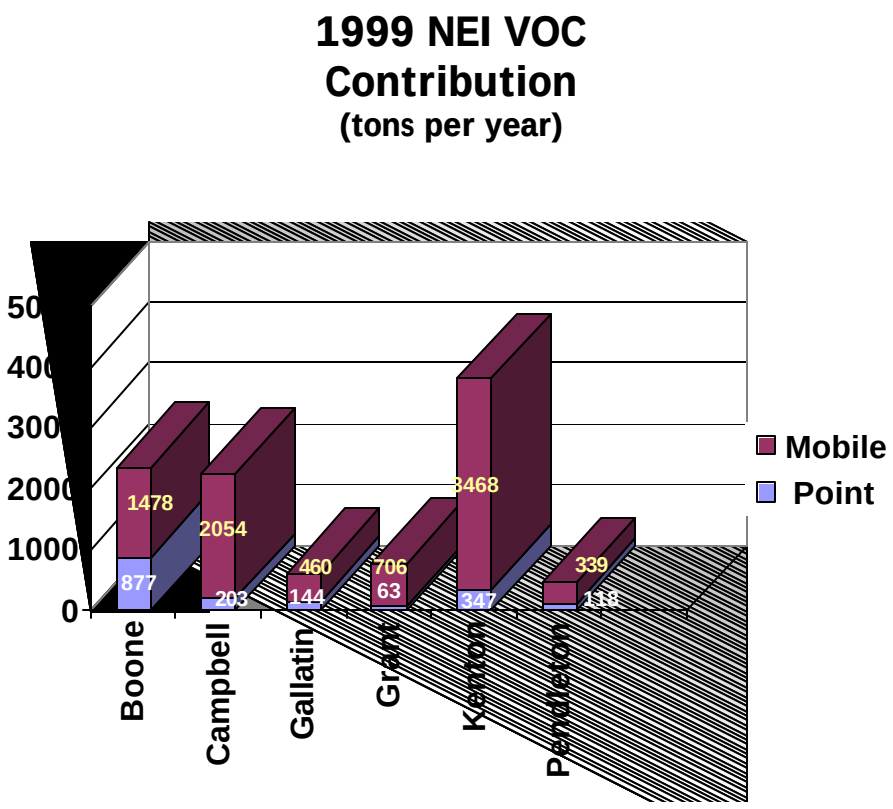
| Commuting Classifications | |
|---|---|
| Not Significant | 0-10% |
| Minimal | 11-30% |
| High | 31-50% |
| Significant | 51% or more |

### Area Sources

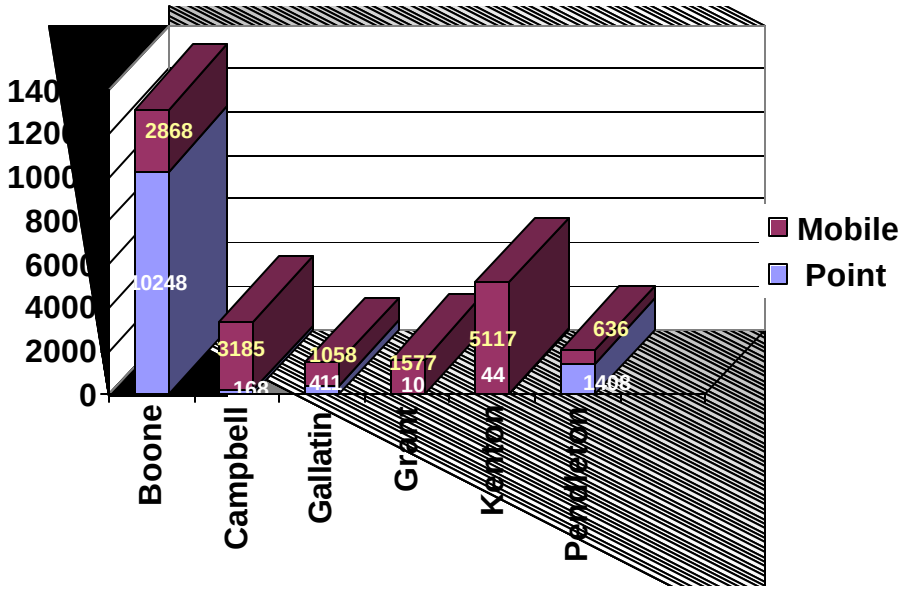
Area source $NH_3$ emissions from Pendleton County were estimated at 473 tons per year in 1999, which represents approximately 21% of the total 2,204 tpy of overall $NH_3$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-F)

Area source $PM_{2.5}$ emissions from Pendleton County were estimated at 372 tons per year in 1999, which represents approximately 8% of the total 4,873 tpy of overall $PM_{2.5}$ area source emissions from the Kentucky portion of the Cincinnati-Hamilton MSA. (See table 1-G)

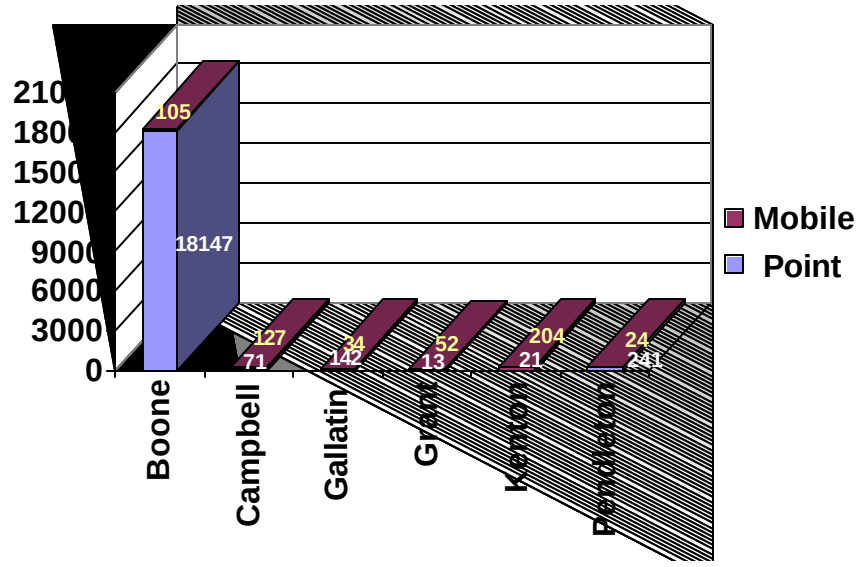


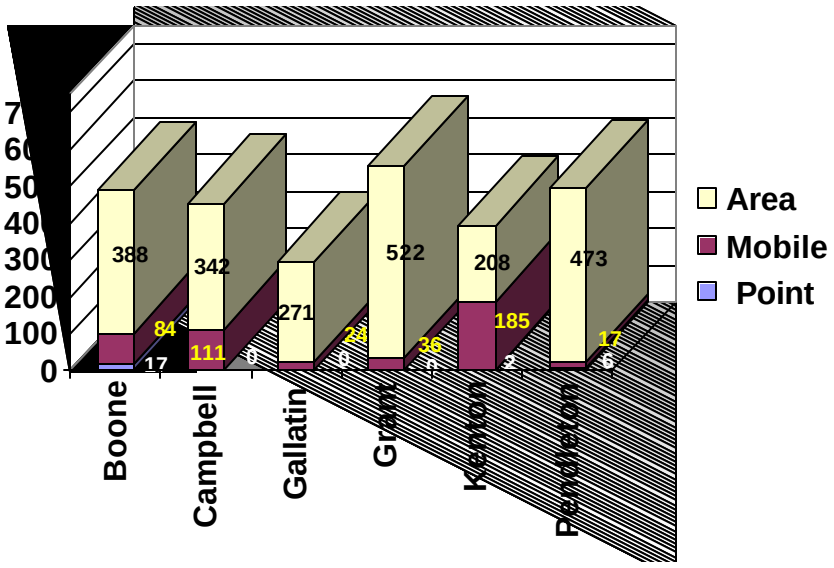
## 1999 NEI $NO_x$ Contribution (tons per year



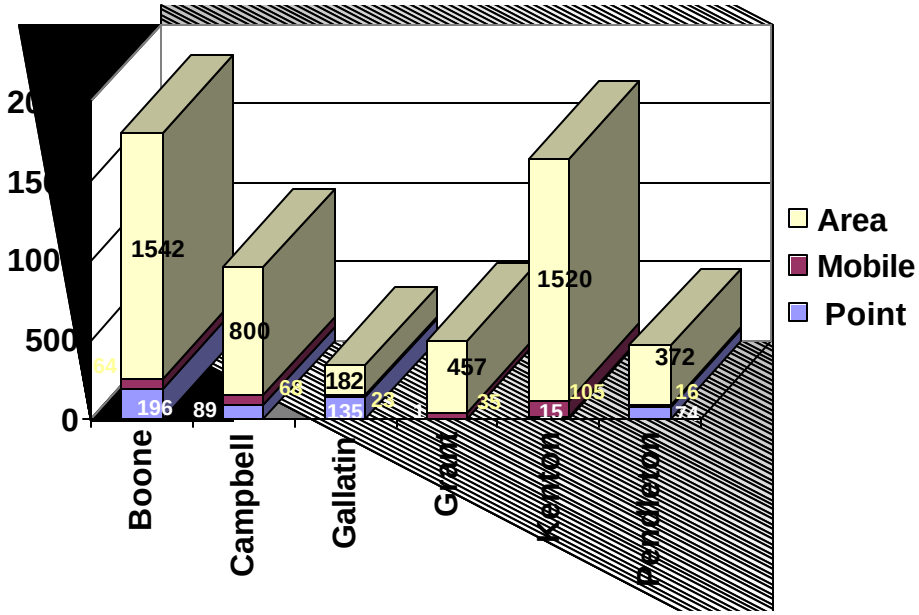

## 1999 NEI $SO_x$ Contribution (tons per year)



## 1999 NEI $NH_3$ Contribution
(tons per year)




## 1999 NEI $PM_{2.5}$ Contribution
(tons per year)



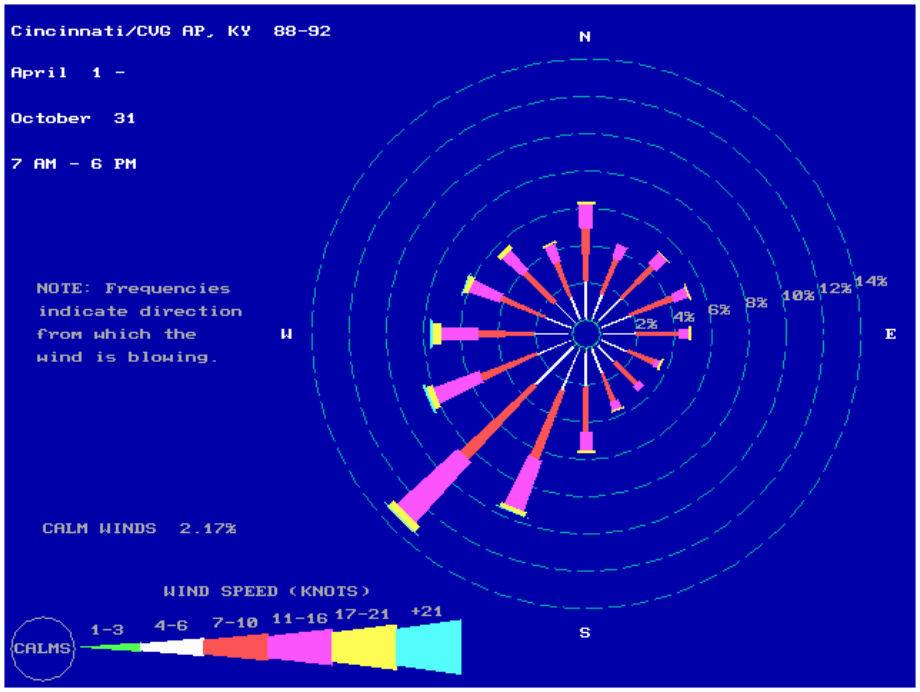
## Conclusion and Recommendation

For the 2001 – 2003 monitoring period, there were no $PM_{2.5}$ monitors located in Pendleton County. However, for the 2001 – 2003 monitoring period, the Kenton County $PM_{2.5}$ monitor directly to the northwest shows an average annual design value of 14.9 micrograms per cubic meter, which achieves the National Ambient Air Quality Standard (NAAQS) and is classified as a county in attainment. As well, for the 2001 – 2003 monitoring period, the Campbell County $PM_{2.5}$ monitor further to the north shows an average annual design value of 13.9 micrograms per cubic meter, which is also in attainment of the standard.

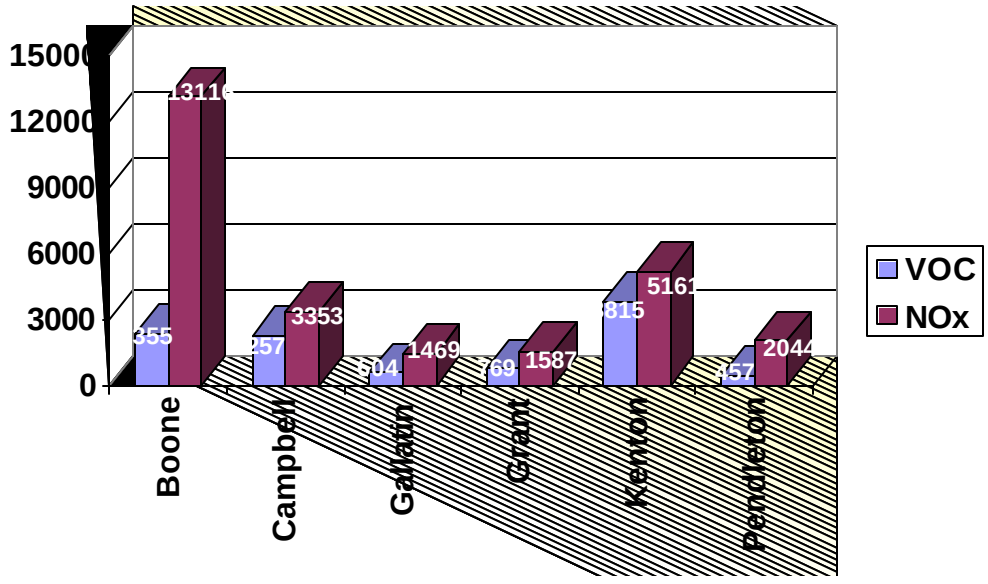
Additionally, the emissions from Pendleton County compared to the remainder of the MSA are negligible and do not significantly contribute to the $PM_{2.5}$ violations in the MSA. Pendleton County contributes approximately 1% of the total $NO_x$ emissions, less than 0.5% of the total $SO_x$ emissions, 6% of the total $NH_3$ emissions and 2% of the total $PM_{2.5}$ emissions in the MSA.

Therefore, based on the monitoring and emissions data Pendleton County should be designated attainment for the $PM_{2.5}$ standard.

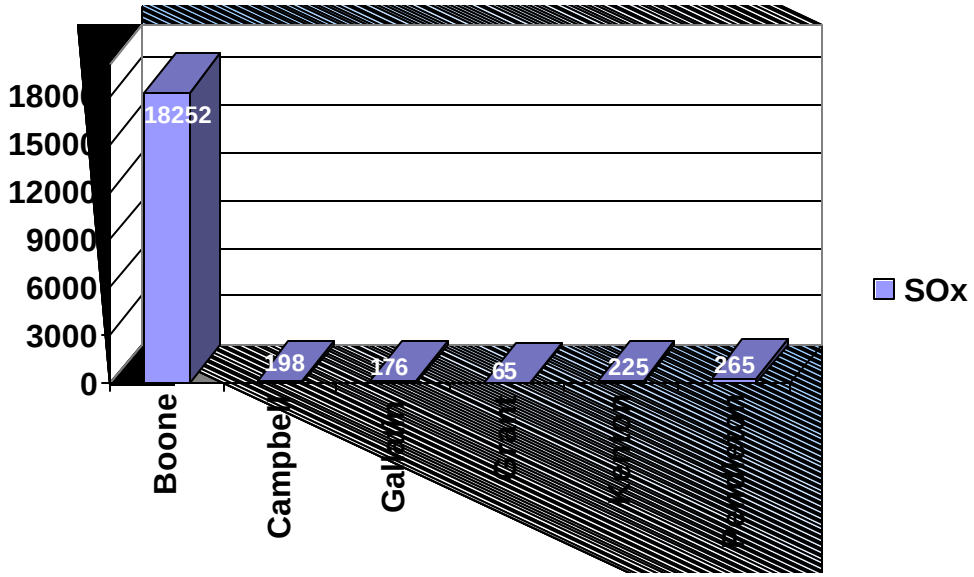
## Cincinnati-Hamilton, OH-KY-IN MSA
## Figure 1-A
## Wind Rose Patterns



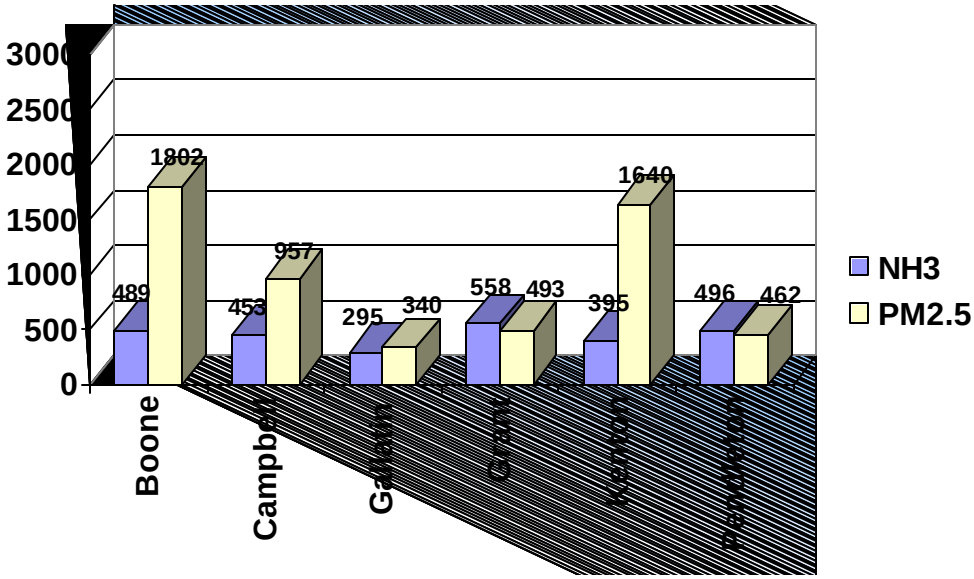

## Figure 1-B
## 1999 NEI
## Kentucky Portion of the Cincinnati-Hamilton MSA
## VOC and $NO_x$ Emissions
**(tons per year)**



## Figure 1-C
## 1999 NEI
## Kentucky Portion of the Cincinnati-Hamilton MSA
## $SO_x$ Emissions
**(tons per year)**




## Figure 1-D
## 1999 NEI
## Kentucky Portion of the Cincinnati-Hamilton MSA
## $NH_3$ and $PM_{2.5}$ Emissions
**(tons per year)**



# Table 1-A
# Annual Average Design Values for PM 2.5
**(micrograms per cubic meter)**

| Monitor | 2001 | 2002 | 2003** | 3-year Average |
|---|---|---|---|---|
| **Kentucky** | | | | |
| **Boone** | - | - | - | N/A |
| **Campbell** | 13.4 | 14.8 | 13.4 | 13.9 |
| **Gallatin** | | | | N/A |
| **Grant** | | | | N/A |
| **Kenton** | 15.3 | 15.1 | 14.3 | 14.9 |
| **Pendleton** | | | | N/A |
| | | | | |
| **Ohio** | | | | |
| **Brown** | - | - | - | N/A |
| **Butler** | 16.4 | 16.8 | 15.2 | 16.1 |
| **Clermont** | - | - | - | N/A |
| **Hamilton** | 18.2 | 17.9 | 17.1 | 17.7 |
| **Warren** | | | | N/A |
| | | | | |
| **Indiana** | | | | |
| **Dearborn** | - | - | - | N/A |
| **Ohio** | - | - | - | N/A |

* n/a no monitoring data available. **The monitoring information for 2003 is complete for the Kentucky counties. However, the 2003 monitoring data reported for the Ohio counties is the latest available and may not be complete through December 2003.

# Table 1-B
# Northern Kentucky Area Population Growth Data

| County | 1990 | 2000 | %Growth 1990 – 2000 | 2010 | %Growth 2000 - 2010 |
|---|---|---|---|---|---|
| | | | | | |
| **Boone** | 57,589 | 85,991 | 49.3% | 126,036 | 46.6% |
| **Campbell** | 83,866 | 88,616 | 5.7% | 92,385 | 4.3% |
| **Gallatin** | 5,393 | 7,870 | 45.9% | 11,638 | 47.9% |
| **Grant** | 15,737 | 22,384 | 42.2% | 32,341 | 44.5% |
| **Kenton** | 142,031 | 151,464 | 6.6% | 159,730 | 5.5% |
| **Pendleton** | 12,036 | 14,390 | 19.6% | 17,690 | 22.9% |

## Table 1-C
## 2002 Estimated Cincinnati-Hamilton, OH-KY-IN MSA Population

| Kentucky | Estimated Population | % of Total |
|---|---|---|
| Boone County | 93,290 | 4.6% |
| Campbell County | 88,604 | 4.4% |
| Gallatin County | 7,836 | <.1% |
| Grant County | 23,620 | 1.1% |
| Kenton County | 152,164 | 7.5% |
| Pendleton County | 14,815 | <.1% |
| Ohio | | |
| Brown County | 43,464 | 2.1% |
| Butler | 340,543 | 16.9% |
| Clermont County | 183,352 | 9.1% |
| Hamilton County | 833,721 | 41.5% |
| Warren County | 175,133 | 8.7% |
| Indiana | | |
| Dearborn County | 47,333 | 2.4% |
| Ohio County | 5,804 | .3% |
| Total Estimated Population | 2,009,679 | |

## Table 1-D
## 1999 NEI Cincinnati-Hamilton, OH-KY-IN MSA
## Kentucky Portion of the MSA
## VOC and $NO_x$ Emissions
**(tons per year)**

| County | *VOC* | | | *$NO_x$* | | |
|---|---|---|---|---|---|---|
| | Point | Mobile | Total | Point | Mobile | Total |
| Boone | 877 | 1,478 | 2,355 | 10,248 | 2,868 | 13,116 |
| Campbell | 203 | 2,054 | 2,257 | 168 | 3,185 | 3,353 |
| Gallatin | 144 | 460 | 604 | 411 | 1,058 | 1,469 |
| Grant | 63 | 706 | 769 | 10 | 1,577 | 1,587 |
| Kenton | 347 | 3,468 | 3,815 | 44 | 5,117 | 5,161 |
| Pendleton | 118 | 339 | 457 | 1,408 | 636 | 2,044 |
| Total | 1,752 | 8,505 | 10,257 | 12,289 | 14,441 | 26,730 |

## Table 1-D (*continued*)
## 1999 NEI Cincinnati-Hamilton, OH-KY-IN MSA
## VOC and $NO_x$ Emissions
**(tons per year)**

| County | *VOC* | | | *$NO_x$* | | |
|---|---|---|---|---|---|---|
| | Point | Mobile | Total | Point | Mobile | Total |
| Dearborn | 939 | 1,148 | 2,087 | 35,554 | 2,246 | 37,800 |
| Ohio | 0 | 111 | 111 | 0 | 206 | 206 |
| Boone | 877 | 1,478 | 2,355 | 10,248 | 2,868 | 13,116 |
| Campbell | 203 | 2,054 | 2,257 | 168 | 3,185 | 3,353 |
| Gallatin | 144 | 460 | 604 | 411 | 1,058 | 1,469 |
| Grant | 63 | 706 | 769 | 10 | 1,577 | 1,587 |
| Kenton | 347 | 3,468 | 3,815 | 44 | 5,117 | 5,161 |
| Pendleton | 118 | 339 | 457 | 1,408 | 636 | 2,044 |
| Brown | 33 | 814 | 847 | 4 | 1,514 | 1,518 |
| Butler | 1,477 | 5,187 | 6,664 | 8,714 | 7,144 | 15,858 |
| Clermont | 276 | 3,077 | 3,353 | 45,274 | 5,066 | 50,340 |
| Hamilton | 1,794 | 16,523 | 18,317 | 30,004 | 22,284 | 52,288 |
| Warren | 241 | 2,509 | 2,750 | 1,389 | 4,188 | 5,577 |
| Total Emissions | 6,512 | 37,874 | 44,386 | 133,228 | 57,089 | 190,317 |

## Table 1-E
## 1999 NEI Cincinnati-Hamilton, OH-KY-IN MSA
## $SO_x$ Emissions
**(tons per year)**

| County | *$SO_x$* | | |
|---|---|---|---|
| | Point | Mobile | Total |
| Dearborn | 51,576 | 79 | 51,655 |
| Ohio | 0 | 8 | 8 |
| Boone | 18,147 | 105 | 18,252 |
| Campbell | 71 | 127 | 198 |
| Gallatin | 142 | 34 | 176 |
| Grant | 13 | 52 | 65 |
| Kenton | 21 | 204 | 225 |
| Pendleton | 241 | 24 | 265 |
| Brown | 0 | 56 | 56 |
| Butler | 1,823 | 288 | 2,111 |
| Clermont | 94,084 | 201 | 94,285 |
| Hamilton | 78,086 | 901 | 78,987 |
| Warren | 0 | 160 | 160 |
| Total Emissions | 244,204 | 2,239 | 246,443 |

# Table 1-F
# 1999 NEI Cincinnati-Hamilton, OH-KY-IN MSA
# $NH_3$ Emissions
**(tons per year)**

| County | $NH_3$ | | | |
|---|---|---|---|---|
| | Area | Point | Mobile | Total |
| Dearborn | 435 | 2 | 56 | 493 |
| Ohio | 510 | 0 | 5 | 515 |
| | | | | |
| Boone | 388 | 17 | 84 | 489 |
| Campbell | 342 | 0 | 111 | 453 |
| Gallatin | 271 | 0 | 24 | 295 |
| Grant | 522 | 0 | 36 | 558 |
| Kenton | 208 | 2 | 185 | 395 |
| Pendleton | 473 | 6 | 17 | 496 |
| | | | | |
| Brown | 544 | 0 | 39 | 583 |
| Butler | 876 | 514 | 246 | 1,636 |
| Clermont | 222 | 3 | 158 | 383 |
| Hamilton | 1,277 | 137 | 817 | 2,231 |
| Warren | 316 | 0 | 128 | 444 |
| | | | | |
| Total Emissions | 6,384 | 681 | 1,906 | 8,971 |

# Table 1-G
# 1999 NEI Cincinnati-Hamilton, OH-KY-IN MSA
# $PM_{2.5}$ Emissions
**(tons per year)**

| County | $PM_{2.5}$ | | | |
|---|---|---|---|---|
| | Area | Point | Mobile | Total |
| Dearborn | 1,076 | 195 | 53 | 1,324 |
| Ohio | 218 | 0 | 5 | 223 |
| | | | | |
| Boone | 1,542 | 196 | 64 | 1,802 |
| Campbell | 800 | 89 | 68 | 957 |
| Gallatin | 182 | 135 | 23 | 340 |
| Grant | 457 | 1 | 35 | 493 |
| Kenton | 1,520 | 15 | 105 | 1,640 |
| Pendleton | 372 | 74 | 16 | 462 |
| | | | | |
| Brown | 1,055 | 1 | 38 | 1,094 |
| Butler | 2,794 | 1,381 | 161 | 4,336 |
| Clermont | 2,425 | 2,487 | 124 | 5,036 |
| Hamilton | 5,416 | 3,962 | 464 | 9,842 |
| Warren | 2,485 | 28 | 96 | 2,609 |
| | | | | |
| Total Emissions | 20,342 | 8,564 | 1,252 | 30,158 |

**Figure 1-C**
**1999 NEI Point Source VOC Emissions for Cincinnati-Hamilton Area**

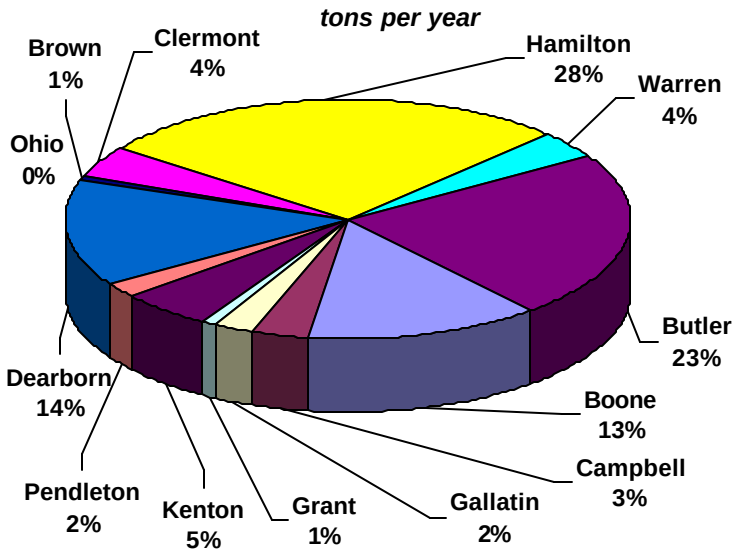



**Figure 1-D**
**1999 NEI Point Source NOx Emissions for Cincinnati-Hamilton Area**

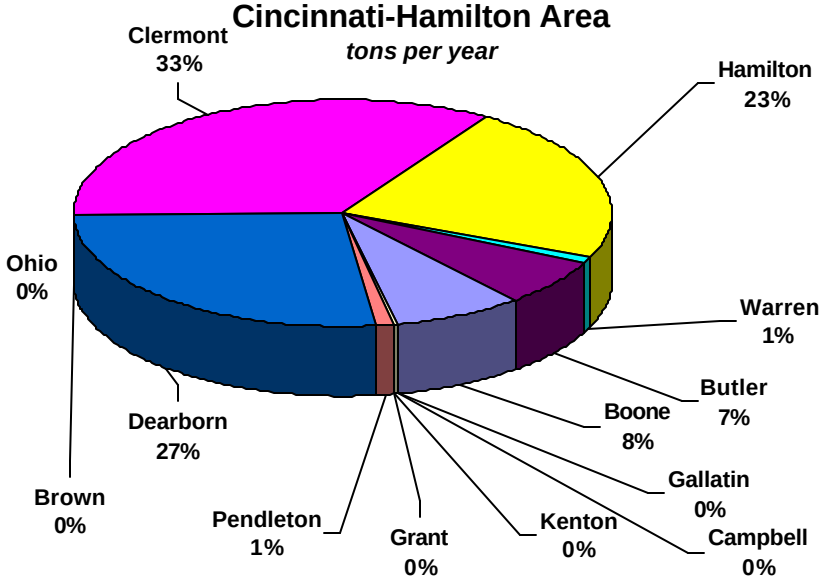


**Figure 1-E**
**1999 NEI Onroad Mobile Source VOC Emissions for Cincinnati-Hamilton Area**
***tons per year***

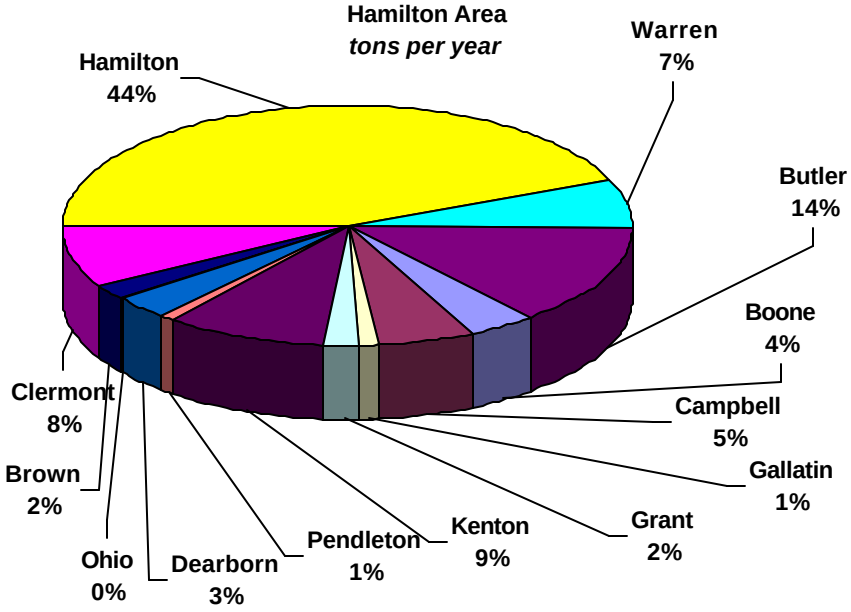



**Figure 1-F**
**1999 NEI Onroad Mobile Source NOx Emissions for Cincinnati-Hamilton Area**
***tons per year***

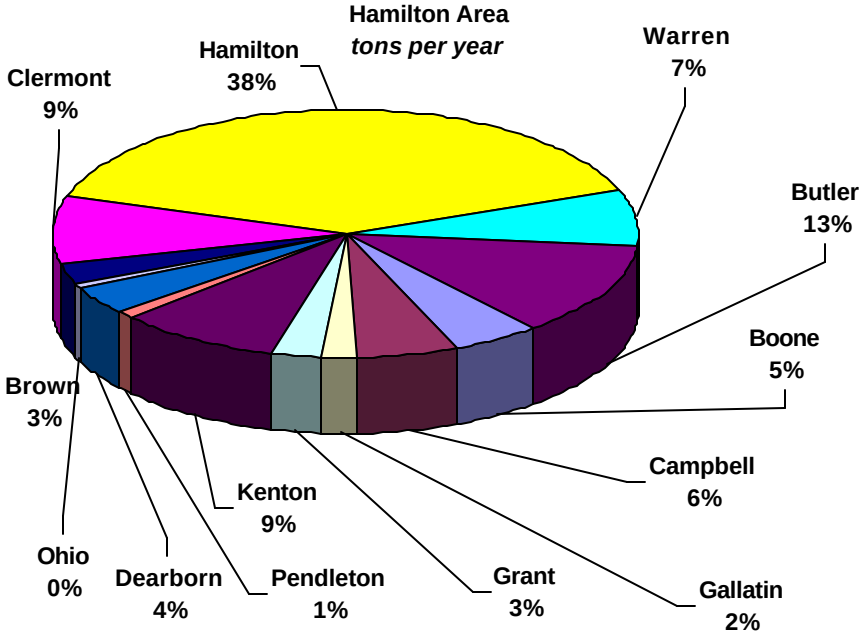


**Figure 1-G**
**1999 NEI Point Source SOx Emissions for Cincinnat Hamilton Area**
***tons per year***

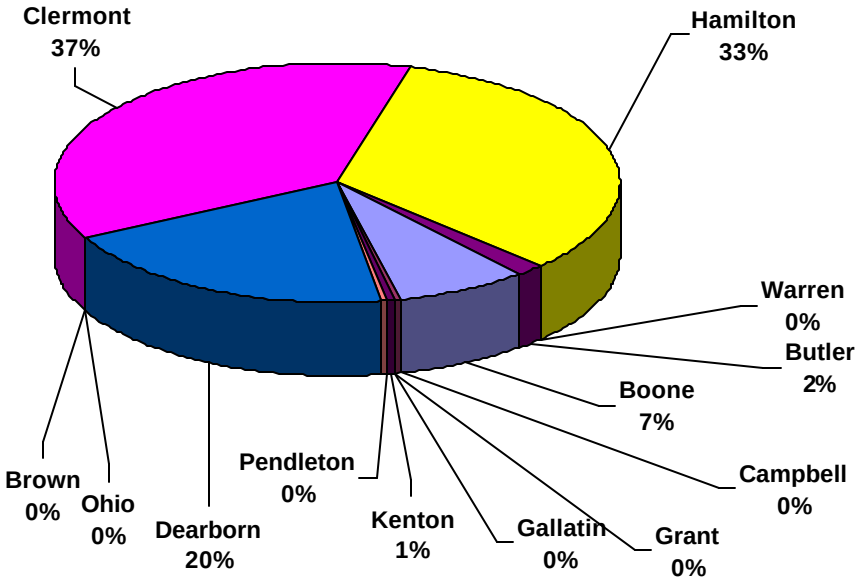



**Figure 1-H**
**1999 NEI Point Source NH3 Emissions for Cincinnat Hamilton Area**
***tons per year***

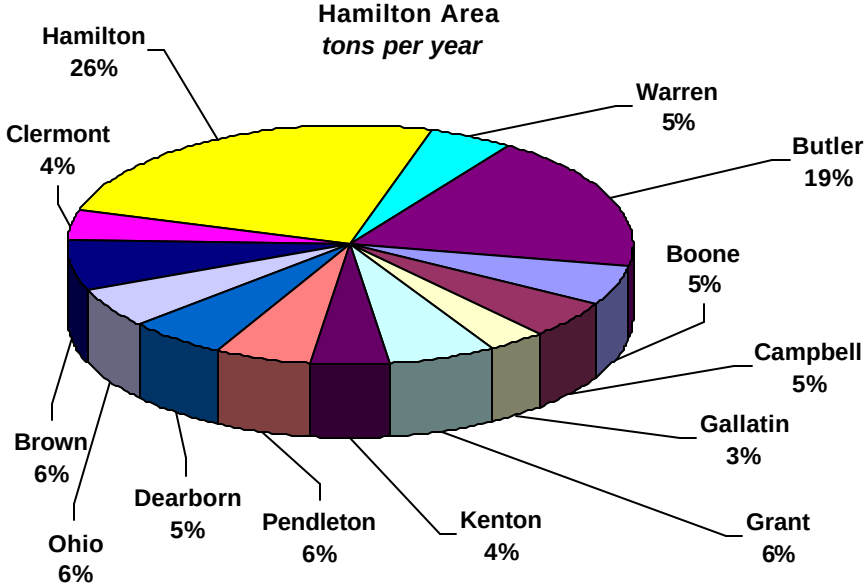


**Figure 1-I**
**1999 NEI Point Source PM2.5-PRI Emissions for Cincinnat**
**Hamilton Area**
***tons per year***